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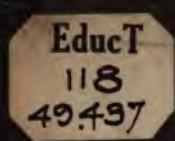
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A

K E Y

TO THE

INTRODUCTION

TO THE

NATIONAL ARITHMETIC,

EXHIBITING THE OPERATION OF

THE MORE DIFFICULT EXAMPLES

IN THAT WORK;

FOR THE USE OF TEACHERS ONLY.

BY BENJAMIN GREENLEAF, A. M.
PRINCIPAL OF BRADFORD TEACHERS' SEMINARY.

New Stereotype Edition.

BOSTON:
PUBLISHED BY ROBERT S. DAVIS,
No. 120 WASHINGTON STREET.

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P R E F A C E.

THE object of the author, in this publication, is to aid the teacher in communicating instruction to his pupils, and in detecting any error, which they may have made in the operation of the examples.

Every instructor, who has a large number of scholars under his care, is aware, that it is a great tax on his time, especially when in school, to examine the operation of many arithmetical questions; whereas, by the aid of a Key, he may readily detect any mistake in the operation. Besides, amid the labors of the school-room, it is often very difficult for the most able arithmetician to recollect, at the moment, all the principles involved in the solution of difficult questions; but, by recurring to a Key, this difficulty will be obviated.

The author would recommend to teachers, never to point out *directly* to the pupil the method of solving a problem, nor perform the labor for him, but suggest and explain such principles, as will enable him to perform the question himself.

The answers to all the examples in the Arithmetic are inserted in the Key, for the convenience of those teachers, who may prefer to use the edition of the Arithmetic, which does not contain the answers.

B. GREENLEAF.

Bradford, March 28, 1849.

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K E Y

TO

GREENLEAF'S INTRODUCTION.

NOTATION AND NUMERATION.

ROMAN NOTATION.

| | | | |
|--------------------|----------|----|--------------|
| 2. (ART. 3, p. 8.) | LXXXVII. | 6. | DXLII. |
| 3. | CX. | 7. | MCCCXIX. |
| 4. | CLXIX. | 8. | MDCCCXLVIII. |
| 5. | CCLXXV. | | |

FRENCH NOTATION AND NUMERATION.

| | | | |
|----------------------|------------|-----|----------------|
| 1. (ART. 13, p. 13.) | 47 | 10. | 408,096 |
| 2. | 359 | 11. | 5,402 |
| 3. | 6,575 | 12. | 907,805,074 |
| 4. | 908 | 13. | 347,915 |
| 5. | 19,000 | 14. | 89,047 |
| 6. | 1,504 | 15. | 51,081 |
| 7. | 27,000,500 | 16. | 7,395 |
| 8. | 99,099 | 17. | 57,059,099,047 |
| 9. | 42,002,005 | | |

ENGLISH NOTATION AND NUMERATION.

| | | |
|----------------------|--|---------------------------------------|
| 1. (ART. 16, p. 15.) | | 325,412 |
| 2. | | 214,165 ; 078,056 |
| 3. | | 42 ; 617,031 ; 041,342 |
| 4. | | 2,008 ; 009,082 ; 701,908 |
| 5. | | 168,247 ; 324,341 ; 472,319 ; 816,421 |

1 *

ADDITION.

| | | | |
|-----------------------|----------|-----|---------------|
| 3. (Art. 21, p. 21.) | 978 | 7. | 698 |
| 4. | 889 | 8. | 999 |
| 5. | 998 | 9. | 439 |
| 6. | 669 | 10. | 868 |
| 10. (Art. 24, p. 23.) | 3555 | 38. | 76833457 |
| 11. | 3212 | 39. | 1111110 |
| 12. | 1922 | 40. | 9323 |
| 13. | 3175 | 41. | 7693486 |
| 14. | 27891 | 42. | 3155917 |
| 15. | 289436 | 43. | 2643 |
| 16. | 354409 | 44. | 1039 |
| 17. | 347514 | 45. | 227934 |
| 18. | 382898 | 46. | 63315 |
| 19. | 26027511 | 47. | 2373544 |
| 20. | 1366855 | 48. | 8272 dollars. |
| 21. | 6908906 | 49. | 131 trees. |
| 22. | 142885 | 50. | 1563 pounds. |
| 23. | 21616 | 51. | 2103 dollars. |
| 24. | 766503 | 52. | 2257 dollars. |
| 25. | 13814 | 53. | 500 dollars. |
| 26. | 969754 | 54. | 9115 dollars. |
| 27. | 11720 | 55. | 2234822 |
| 28. | 31622 | 56. | 5073577 |
| 29. | 949661 | 57. | 4597824 |
| 30. | 86578 | 58. | 4984097 |
| 31. | 539658 | 59. | 172246 |
| 32. | 57372 | 60. | 95947 |
| 33. | 848340 | 61. | 102201 |
| 34. | 1000779 | 62. | 100536 |
| 35. | 694764 | 63. | 113378 |
| 36. | 156800 | 64. | 86621 |
| 37. | 1802790 | | |

SUBTRACTION.

| | | | |
|----------------------|---------------|-----|---------------------|
| 8. (ART. 32, p. 32.) | 47896 | 27. | 89901 |
| 9. | 265899 | 28. | 90909091 |
| 10. | 587544 | 29. | 999991 |
| 11. | 377778 | 30. | 2967 |
| 12. | 9893239896470 | 31. | 99995000 |
| 13. | 1 | 32. | 767 dollars. |
| 14. | 471112 | 33. | 39 years. |
| 15. | 981012 | 34. | 105 years. |
| 16. | 1 | 35. | 366 |
| 17. | 9998392 | 36. | 219327 inhabitants. |
| 18. | 6097700810072 | 37. | 85423333 pounds. |
| 19. | 7977100909213 | 38. | 1176249 bushels. |
| 20. | 7100061569987 | 39. | 3528 dollars. |
| 21. | 500710920089 | 40. | 18 dollars. |
| 22. | 1 | 41. | 7965037 dollars. |
| 23. | 455555556 | 42. | 577904 |
| 24. | 8753086431 | 43. | 2588 acres. |
| 25. | 799690466 | 44. | 49841021 miles. |
| 26. | 24974975 | | |

MULTIPLICATION.

| | | | |
|----------------------|------------------|-----|-----------------|
| 9. (ART. 36, p. 38.) | 6910677 | 14. | 50246229 |
| 10. | 7012310120 | 15. | 60725 dollars. |
| 11. | 53580296 | 16. | 228456 dollars. |
| 12. | 24881935 | 17. | 27918 letters. |
| 13. | 105185376 | | |
| | | | |
| (ART. 40, p. 41.) | | 12. | 10989 dollars. |
| 8. | 611 dollars. | 13. | 13505 miles. |
| 9. | 2813 dollars. | 14. | 8760 hours. |
| 10. | 35599 dollars. | 15. | 5481 gallons. |
| 11. | 1853654 dollars. | 16. | 200451 dollars. |

KEY TO

| | | | |
|----------------------|--------------------|-------|-----------------|
| 17. | 68816 pounds. | 26. | 532088 |
| 18. | 321300 | 27. | 3831635 |
| 19. | 518077 | 28. | 1462126 |
| 20. | 881919 | 29. | 264640056 |
| 21. | 9691836 | 30. | 99070437 |
| 22. | 18219071 | 31. | 826888542 |
| 23. | 70287492 | 32. | 290355807 |
| 24. | 153288487686 | 33. | 721361144 |
| 25. | 49062139937803 | 34. | 3798979491 |
| <hr/> | | <hr/> | |
| 2. (Art. 42, p. 43.) | 765325 | 6. | 2851200 inches. |
| 3. | 123396 | 7. | 631152 hours. |
| 4. | 611226 | 8. | 68520 feet. |
| 5. | 987625 | | |
| <hr/> | | <hr/> | |
| 2. (Art. 43, p. 44.) | 23560 | 4. | 7964000 |
| 3. | 587300 | 5. | 9872500000 |
| <hr/> | | <hr/> | |
| (Art. 44, p. 45.) | | 9. | 696609000000000 |
| 4. | 72103581726300 | 10. | 910089999000 |
| 5. | 490154012100000000 | 11. | 24010024010000 |
| 6. | 28522743249000 | 12. | 400400800400400 |
| 7. | 4179911100000 | 13. | 1224241200000 |
| 8. | 11717175236000 | 14. | 14122412100 |

DIVISION.

(Art. 50, p. 50.)

| | Quotients. | Rem. | Quotients. | Rem. |
|-----|------------|------|------------|---------------|
| 5. | 757913 | 0 | 14. | 54848 5 |
| 6. | 1460898 | 1 | 15. | 186529 6 |
| 7. | 141090 | 5 | 16. | 958131 11 |
| 8. | 47316 | 4 | 17. | 1135791 1 |
| 9. | 994864 | 8 | 18. | 162255 6 |
| 10. | 698082 | 1 | 19. | 202818 6 |
| 11. | 528776 | 9 | 20. | 225353 3 |
| 12. | 79992 | 4 | 21. | 187794 2 |
| 13. | 55096 | 6 | 22. | 170721 9 |
| | | | | 78715 dollars |

| | | | |
|-----|-----------------|-----|---------------|
| 24. | 17167 acres. | 28. | 99483 yards. |
| 25. | 876451 dollars. | 29. | 109517 acres. |
| 26. | 14888 dollars. | 30. | 371 dollars. |
| 27. | 9589 bushels. | 31. | 1315 |

| | Quotients. | Rem. | | Quotients. | Rem. |
|----------------------|------------|------|----|------------|------|
| 2. (ART. 51, p. 52.) | 216 | 0 | 4. | 13717421 | 0 |
| 3. | 89786 | 10 | 5. | 32534467 | 5 |

| | | | | | |
|-----------------------|----------|-----|-----|---------------------|---------------|
| 10. (ART. 54, p. 54.) | 234 | | 27. | 5502 | 95 |
| 11. | 365 | | 28. | 9755 | 4060 |
| 12. | 145 | 6 | 29. | 3453 | 7122 |
| 13. | 7634 | 0 | 30. | 30003 | 0 |
| 14. | 5204 | 11 | 31. | 26750 | 962 |
| 15. | 290720 | 25 | 32. | 86268755 | 480 |
| 16. | 68549 | 88 | 33. | 8428688 | 22346 |
| 17. | 240415 | 5 | 34. | 62927 | 2295060 |
| 18. | 15608 | 5 | 35. | 1099 | 200210510 |
| 19. | 129725 | 66 | 36. | 476 | dollars. |
| 20. | 144927 | 36 | 37. | 395 | acres. |
| 21. | 14703 | 55 | 38. | 763 | dollars. |
| 22. | 1919 | 55 | 39. | 345 | bushels each. |
| 23. | 912 | 30 | 40. | 389 | dollars. |
| 24. | 3502319 | 714 | 41. | 1234 | men. |
| 25. | 26080418 | 234 | 42. | 65384 $\frac{7}{9}$ | dollars. |
| 26. | 11058232 | 277 | | | |

| | | | | |
|----------------------|-------|--|----|------|
| 2. (ART. 55, p. 56.) | 30613 | | 5. | 7901 |
| 3. | 1469 | | 6. | 182 |
| 4. | 7546 | | 7. | 264 |

| | | | | |
|----------------------|----|--|----|-----|
| 3. (ART. 56, p. 57.) | 54 | | 5. | 77 |
| 4. | 20 | | 6. | 405 |

| | Quotients. | Rem. | | Quotients. | Rem. |
|----------------------|------------|------|----|------------|----------|
| 2. (ART. 57, p. 58.) | 689 | 2 | 4. | 24 | 815 |
| 3. | 43 | 75 | 5. | 9876 | 54321123 |

KEY TO

| (ART. 58, p. 59.) | | | Quotients. | Rem. |
|-------------------|------------|------|------------|----------------|
| | Quotients. | Rem. | 5. | 1473 |
| 2. | 44 | 74 | 6. | 102 |
| 3. | 332 | 192 | 7. | 3491706185 |
| 4. | 667 | 253 | 8. | 85 44916000000 |

CONTRACTIONS IN MULTIPLICATION.

| (ART. 59, p. 60.) | | | 3. | 14197467925 |
|-------------------|-------------|--|----|--------------|
| 2. | 1914741450 | | 4. | 3086419725 |
| (ART. 60, p. 60.) | | | 3. | 29037739400 |
| 2. | 11892984700 | | 4. | 19454930400 |
| (ART. 61, p. 60.) | | | 3. | 154320875 |
| 2. | 995665625 | | 4. | 381232750 |
| (ART. 62, p. 61.) | | | 3. | 876542123457 |
| 2. | 1233332433 | | 4. | 999998000001 |

CONTRACTIONS IN DIVISION.

| | | | |
|----------------------|---------------------------|----|-------------------------|
| 2. (ART. 63, p. 61.) | 395061 | 4. | 35999 $\frac{88}{100}$ |
| 3. | 55157 | | |
| (ART. 64, p. 62.) | | | 4. |
| 2. | 29629629 $\frac{63}{100}$ | 5. | 143686 $\frac{8}{100}$ |
| 3. | 261371 $\frac{34}{100}$ | 6. | 2690 $\frac{28}{100}$ |
| 2. (ART. 65, p. 62.) | | | 5. |
| 3. | 3830106 | 6. | 535 $\frac{62}{100}$ |
| 4. | 4729879 | | 3917 $\frac{184}{1000}$ |
| | | | 6689 $\frac{472}{1000}$ |

MISCELLANEOUS EXAMPLES.

| | | | |
|-------------|----------------|----|--------------|
| 1. (p. 63.) | 584 dollars. | 4. | 1530 cents. |
| 2. | 25088 dollars. | 5. | 873 dollars. |
| 3. | 940 cents. | 6. | 4257 cents. |

| | | | |
|-----|-------------------|-----|----------------------------|
| 7. | 2106 miles. | 27. | 25 |
| 8. | 61 miles. | 28. | 135442 |
| 9. | 35405 dollars. | 29. | 144 feet. |
| 10. | 42884 dollars. | 30. | 123040 rods. |
| 11. | 7665 dollars. | 31. | 630 dollars. |
| 12. | 37 dollars. | 32. | 187 dollars. |
| 13. | 47 dollars. | 33. | 1188 dollars. |
| 14. | 1368 hours. | 34. | 413 dollars. |
| 15. | 5904 ounces. | 35. | 5430 dollars. |
| 16. | 56960 acres. | 36. | 457 dollars. |
| 17. | 234 dollars. | 37. | Loss, 3 dollars. |
| 18. | 3178 dollars. | 38. | Gain, 22 dollars. |
| 19. | 7581 dollars. | 39. | The land, by 5136 dollars. |
| 20. | Gain, 1488 cents. | 40. | 543 dollars. |
| 21. | 576 dollars. | 41. | 635 dollars. |
| 22. | 20 dollars. | 42. | 743 dollars. |
| 23. | 255 dollars. | 43. | 1828 dollars. |
| 24. | 3520 | 44. | 133 dollars. |
| 25. | 1607 | 45. | 27 dollars. |
| 26. | 5666 | 46. | 533 dollars. |

UNITED STATES MONEY.

| | | | |
|-------------------|---------------|----|--------------|
| (Art. 70, p. 69.) | | | |
| 1. | 12500 cents. | 5. | \$ 41.23 |
| 2. | 345000 mills. | 6. | 15629 cents. |
| 3. | 29,7 cents. | 7. | 16428 mills. |
| 4. | \$ 2.68,2 | 8. | 9870 mills. |

ADDITION.

| | | | |
|-------------------|--------------|-----|------------|
| (Art. 71, p. 70.) | | | |
| 5. | \$ 4408.88,8 | 11. | \$ 13.87,0 |
| 6. | \$ 410.46,9 | 12. | \$ 31.64,0 |
| 7. | \$ 448.36,8 | 13. | \$ 21.62,0 |
| 8. | \$ 4713.78,6 | 14. | \$ 3.42,5 |
| 9. | \$ 31.61,0 | 15. | \$ 15.00,0 |
| | | | \$ 48.32,0 |

SUBTRACTION.

| | | | |
|----------------------|-------------|-----|------------|
| 5. (Art. 72, p. 71.) | \$ 52.66,4 | 10. | \$ 82.83,0 |
| 6. | \$ 71.97,6 | 11. | \$ 26.58,0 |
| 7. | \$ 724.89,8 | 12. | \$ 9.99,1 |
| 8. | \$ 782.20,6 | 13. | \$ 14.74,0 |
| 9. | \$ 65.98,0 | 14. | \$ 34.67,1 |

MULTIPLICATION.

| | | |
|-------------------|--------------|----------|
| (Art. 73, p. 72.) | 8. | \$ 85.50 |
| 3. | \$ 44.55,0 | 9. |
| 4. | \$ 414.64,0 | 10. |
| 5. | \$ 7.31,0 | 11. |
| 6. | \$ 30.87,5 | 12. |
| 7. | \$ 1774.25,0 | 13. |

DIVISION.

| | | | |
|----------------------|-----------|-----|-----------|
| 3. (Art. 74, p. 73.) | \$ 137.37 | 9. | \$ 0.93 |
| 4. | \$ 5.63 | 10. | \$ 3.28 |
| 5. | \$ 20.00 | 11. | \$ 11.67 |
| 6. | \$ 0.59 | 12. | \$ 4.68 |
| 7. | \$ 5.68 | 13. | \$ 132.55 |
| 8. | \$ 0.13 | 14. | \$ 5.75 |

PRACTICAL QUESTIONS BY ANALYSIS.

| | | | |
|----------------------|-----------|----|------------|
| 2. (Art. 76, p. 74.) | \$ 90.21 | 6. | \$ 68.40 |
| 3. | \$ 29.70 | 7. | \$ 5525.28 |
| 4. | \$ 42.21 | 8. | \$ 737.64 |
| 5. | \$ 728.19 | | |

10. (Art. 77, p. 75.) $\$ 422.50 \div 65 = \$ 6.50$; $\$ 6.50 \times 15 = \$ 97.50$ Ans.

11. $\$ 2025 \div 45 = \$ 45$; $\$ 45 \times 180 = \$ 8100$ Ans.

12. $\$ 3.45 \div 5 = \$ 0.69$; $\$ 0.69 \times 11 = \$ 7.59$ Ans.

13. $\$ 214.50 \div 11 = \$ 19.50$; $\$ 19.50 \times 87 = \$ 1696.50$ Ans.

14. $\$ 60.00 \div 8 = \$ 7.50$; $\$ 7.50 \times 87 = \$ 652.50$ Ans.

15. $\$ 5.58 \div 9 = \$ 0.62$; $\$ 0.62 \times 43 = \$ 26.66$ Ans.

16. $\$ 85 \div 5 = \$ 17$; $\$ 17 \times 97 = \$ 1649$ Ans.

17. $\$ 3.80 + 20 = \$ 0.19$; $\$ 0.19 \times 59 = \$ 11.21$ Ans.
 18. $\$ 472.50 \div 27 = \$ 17.50$; $\$ 17.50 \times 12 = \$ 210$ Ans.
 19. $\$ 39.69 \div 7 = \$ 5.67$; $\$ 5.67 \times 57 = \$ 323.19$ Ans.
 20. $\$ 10.08 + 144 = \$ 0.07$; $\$ 0.07 \times 359 = \$ 25.13$ Ans.
 21. $\$ 77.13 \div 857 = \$ 0.09$; $\$ 0.09 \times 359 = \$ 32.31$ Ans.
 22. $\$ 187.53 \div 987 = \$ 0.19$; $\$ 0.19 \times 329 = \$ 62.51$ Ans.
 23. $\$ 26.32 \div 47 = \$ 0.56$; $\$ 0.56 \times 39 = \$ 21.84$ Ans.

 25. (AET. 78, p. 76.) $\$ 175 \div \$ 5 = 35$ reams, Ans.
 26. $\$ 217.50 \div \$ 7.50 = 29$ barrels, Ans.
 27. $\$ 4875 \div \$ 75 = 65$ tons, Ans.
 28. $\$ 1728 \div \$ 4 = 432$ yards, Ans.
 29. $\$ 9.66 \div \$ 0.69 = 14$ hundred weight, Ans.
 30. $\$ 66.51 \div \$ 7.39 = 9$ barrels, Ans.
 31. $\$ 136.50 \div \$ 3.25 = 42$ cords, Ans.

BILLS.

(AET. 79, p. 77.)

| | | | |
|------|--------------------------------|------|--------------------------------|
| (1.) | J. Smith. | (2.) | L. Webster. |
| | $\$ 0.75 \times 82 = \$ 61.50$ | | $\$ 0.18 \times 6 = \$ 1.08$ |
| | $0.92 \times 89 = 81.88$ | | $0.20 \times 12 = 2.40$ |
| | $0.50 \times 24 = 12.00$ | | $1.80 \times 6 = 10.80$ |
| | <hr/> | | $0.26 \times 30 = 7.80$ |
| | $\$ 155.38$ | | <hr/> |
| | | | $\$ 22.08$ |
| (3.) | J. Kimball. | (4.) | W. Greenleaf. |
| | $\$ 0.63 \times 14 = \$ 8.82$ | | $\$ 0.50 \times 86 = \$ 43.00$ |
| | $0.88 \times 12 = 10.56$ | | $0.86 \times 90 = 77.40$ |
| | $0.62 \times 23 = 14.26$ | | $11.00 \times 18 = 198.00$ |
| | $1.27 \times 16 = 20.32$ | | $3.50 \times 23 = 80.50$ |
| | $2.25 \times 17 = 38.25$ | | $0.62 \times 14 = 8.68$ |
| | <hr/> | | $12.12 \times 12 = 145.44$ |
| | $\$ 92.21$ | | $12.00 \times 46 = 552.00$ |
| | | | <hr/> |
| | | | $\$ 1105.02$ |

(5.) A. Dow.

$$\begin{aligned}
 \$23.75 \times 37 &= \$878.75 \\
 17.50 \times 42 &= 735.00 \\
 99.00 \times 43 &= 4257.00 \\
 175.00 \times 12 &= 2100.00 \\
 7.00 \times 19 &= 133.00 \\
 1.52 \times 23 &= 34.96 \\
 &\hline \\
 &\$8138.71
 \end{aligned}$$

(6.) N. Webster.

$$\begin{aligned}
 \$1.20 \times 80 &= \$96.00 \\
 3.00 \times 17 &= 51.00 \\
 1.08 \times 19 &= 20.52 \\
 0.75 \times 23 &= 17.25 \\
 &\hline \\
 &\$184.77
 \end{aligned}$$

(7.) S. Osgood.

$$\begin{aligned}
 \$0.20 \times 27 &= \$5.40 \\
 3.90 \times 10 &= 39.00 \\
 4.75 \times 7 &= 33.25 \\
 2.93 \times 19 &= 55.67 \\
 0.37 \times 20 &= 7.40 \\
 &\hline \\
 &\$140.72
 \end{aligned}$$

REDUCTION.

(AET. 86, p. 86.)

$$\begin{array}{r}
 (3.) \\
 9\text{£. } 18\text{s. } 7\text{d.} \\
 20 \\
 \hline
 198\text{s.} \\
 12 \\
 \hline
 2383\text{d. Ans.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 12)2383\text{d.} \\
 20)198\text{s. } 7\text{d.} \\
 \hline
 \text{Ans. } 9\text{£. } 18\text{s. } 7\text{d.}
 \end{array}$$

$$\begin{array}{r}
 (5.) \\
 14\text{£. } 11\text{s. } 5\text{d. } 2\text{qr.} \\
 20 \\
 \hline
 291\text{s.} \\
 12 \\
 \hline
 3497\text{d.} \\
 4 \\
 \hline
 13990\text{qr. Ans.}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 4)13990\text{qr.} \\
 12)3497\text{d. } 2\text{qr.} \\
 20)291\text{s. } 5\text{d.} \\
 \hline
 \text{Ans. } 14\text{£. } 11\text{s. } 5\text{d. } 2\text{qr.}
 \end{array}$$

(ART. 87, p. 88.)

| | | |
|---|--|---|
| (3.) 76dwt. 12gr. <u>24</u> 306 153 Ans. 1836gr. | (4.) 24) <u>1836</u> gr. Ans. 76dwt. 12gr. 12 917oz. 18340dwt. <u>24</u> | (5.) 76lb. 5oz. <u>12</u> 20 Ans. 440160gr. |
|---|--|---|

| | | |
|---|--|--|
| (6.) 24) <u>440160</u> gr. 20) <u>18340</u> dwt. 12) <u>917</u> oz. Ans. 76lb. 5oz. | (7.) 144lb. 9oz. <u>12</u> 1737oz. <u>20</u> Ans. 34740dwt. | (8.) 20) <u>34740</u> dwt. 12) <u>1737</u> oz. Ans. 144lb. 9oz. |
|---|--|--|

| | | |
|--|--|---|
| (9.) 24) <u>17895</u> gr. 20) <u>745</u> dwt. 15gr. 12) <u>37</u> oz. 5dwt. Ans. 3lb. 1oz. [5dwt. 15gr. | (10.) 3lb. 1oz. 5dwt. 15gr. <u>12</u> 37oz. <u>20</u> 745dwt. <u>24</u> Ans. 17895gr. | (11.) 2oz. 18dwt. 12gr. <u>20</u> 58dwt. <u>24</u> 1404gr. <u>1.37</u> Ans. \$ 1923.48 |
|--|--|---|

(ART. 88, p. 89.)

| | | | |
|---|--|--|--|
| (3.) 76lb <u>12</u> 912½ 8 <u>7296</u> 3 3 21888D Ans. | (4.) 3) <u>21888</u> D 8) <u>7296</u> 3 12) <u>912</u> 3 Ans. 76lb | (5.) 144lb <u>12</u> 1728½ 8 13824½ 3 41472D <u>20</u> | (6.) 20) <u>829440</u> gr. 3) <u>41472</u> D 8) <u>13824</u> 3 12) <u>1728</u> ½ Ans. 144lb Ans. 829440gr. |
|---|--|--|--|

| (7.) | (8.) | (9.) |
|---|--|-----------------------|
| 12lb 8 $\frac{3}{4}$ 3 $\frac{3}{4}$ 1D 18gr. | 20) 73178gr. | 7 $\frac{3}{4}$ 63 2D |
| 12 | 3) 3658D 18gr. | 8 |
| 152 $\frac{3}{4}$ | 8) 1219 $\frac{3}{4}$ 1D | 62 $\frac{3}{4}$ |
| 8 | 12) 152 $\frac{3}{4}$ 33 | 3 |
| 1219 $\frac{3}{4}$ | Ans. 12lb 8 $\frac{3}{4}$ 3 $\frac{3}{4}$ 1D 18gr. | |
| 3 | Ans. 12lb 8 $\frac{3}{4}$ 3 $\frac{3}{4}$ 1D 18gr. | |
| 3658D | | |
| 20 | | |
| 73178gr. | Ans. | |

(Art. 89, p. 90.)

| (3.) | (4.) |
|-----------------------------------|--|
| 16T. 19cwt. 0qr. 10lb. 11oz. 5dr. | |
| 20 | |
| 339cwt. | 16) 9722549dr. |
| 4 | 16) 607659oz. 5dr. |
| 1356qr. | 28) 37978lb. 11oz. |
| 28 | 4) 1356qr. 10lb. |
| 37978lb. | 20) 339cwt. 0qr. |
| 16 | Ans. 16T. 19cwt. 0qr. 10lb. 11oz. 5dr. |
| 607659oz. | |
| 16 | |
| 9722549dr. | Ans. |

| (5.) | (6.) | (7.) | (8.) |
|-----------|--------------|-------------------|-----------------|
| 679cwt. | 28) 76048lb. | 17cwt. 3qr. 18lb. | 48T. 17cwt. |
| 4 | 4) 2716qr. | 4 | 20 |
| 2716qr. | Ans. 679cwt. | 71qr. | 977cwt. |
| 28 | | 28 | 4 |
| 76048lb. | | 2006lb. | 3908qr. |
| Ans. | .07 | | 28 |
| \$ 140.42 | | | 109424lb. |
| | | | .08 |
| | | | Ans. \$ 8753.92 |

(Art. 90, p. 92.)

| | | |
|-------------------------|--------------------|------------------------|
| (3.) | (4.) | (5.) |
| 144yd. 3qr. | <u>4</u> 579qr. | 17 E.E. 4qr. 3na. |
| <u>4</u> | Ans. 144yd. 3qr. | <u>5</u> |
| Ans. 579qr. | | <u>89qr.</u> |
| | | <u>4</u> |
| | | Ans. 359na. |
| (6.) | (7.) | (8.) |
| 4) <u>359</u> na. | 126yd. 0qr. 3na. | 4) <u>2019</u> na. |
| 5) <u>89qr.</u> 3na. | <u>4</u> | 4) <u>504</u> qr. 3na. |
| Ans. 17 E. E. 4qr. 3na. | 504qr. <u>4</u> | Ans. 126yd. 0qr. 3na. |
| | | |
| | Ans. 2019na. | |

| | | |
|------------------|--|------------------|
| (9.) | | (10.) |
| 49yd. 3qr. | | 144yd. 1qr. 3na. |
| <u> 4</u> | | <u> 4</u> |
| 199qr. | | 577qr. |
| <u> 2.17</u> | | <u> 4</u> |
| Ans. \$ 431.83 | | 2311na. .25 |

(Art. 91, p. 93.)

$$(3.) \quad (4.)$$

| | |
|-----------------------------|----------------------------------|
| (3.) | (4.) |
| 47m. | <u>16\frac{1}{2}</u>) 248160ft. |
| <u>8</u> | <u>40</u>) 15040rd. |
| <u>376fur.</u> | <u>8</u> <u>376fur.</u> |
| <u>40</u> | |
| <u>15040rd.</u> | Ans. 47m. |
| <u><u>16\frac{1}{2}</u></u> | |
| Ans. 248160ft. | |

| | | |
|---|------------------------------|------------------------------|
| | (5.) | |
| 78deg. 50m. 7fur. 30rd. 5yd. 2ft. 10in. | | |
| <u>69½</u> | | |
| 5471m. | | |
| <u>8</u> | (6.) | |
| 43775fur. | 12) <u>346704154</u> in. | |
| <u>40</u> | 3) <u>28892012</u> ft. 10in. | |
| 1751030rd. | 5½) <u>9630670</u> yd. 2ft. | |
| <u>5½</u> | 40) <u>1751030</u> rd. 5yd. | |
| 9630670yd. | 8) <u>43775</u> fur. 30rd. | |
| <u>3</u> | 69½) <u>5471</u> m. 7fur. | |
| 28892012ft. | | Ans. 78deg. 50m. 7fur. 30rd. |
| <u>12</u> | | [5yd. 2ft. 10in.] |
| 346704154in. Ans. | | |

| | | |
|------------------------|-----------------------|--------------------------|
| | (Art. 92, p. 95.) | |
| (3.) | (4.) | (5.) |
| 80) <u>4386</u> cha. | 54m. 66cha. | 75m. 49cha. |
| Ans. 54m. 66cha. | <u>80</u> | <u>80</u> |
| | Ans. <u>4386</u> cha. | <u>6049</u> cha. |
| | | <u>4</u> |
| (6.) | (7.) | (8.) |
| 4) <u>24196</u> poles. | 7m. 4fur. 30rd. | Ans. <u>24196</u> poles. |
| 80) <u>6049</u> cha. | <u>8</u> | |
| Ans. 75m. 49cha. | 60fur. | <u>25)60750</u> li. |
| | <u>40</u> | |
| | <u>2430</u> rd. | 40) <u>2430</u> rd. |
| | <u>25</u> | 8) <u>60</u> fur. 30rd. |
| Ans. <u>60750</u> li. | | Ans. 7m. 4fur. 30rd. |

| | | |
|-------------------------|-------------------------|-----------------------|
| | (Art. 93, p. 97.) | |
| (3.) | (4.) | |
| 49A. 3R. 16p. | <u>272½)2171466</u> ft. | |
| <u>4</u> | <u>40)7976</u> p. | |
| 199R. | | 4) <u>199</u> R. 16p. |
| <u>40</u> | | Ans. 49A. 3R. 16p. |
| 7976p. | | |
| <u>272½</u> | | |
| Ans. <u>2171466</u> ft. | | |

| (5.) | (6.) |
|--------------------|---|
| 365A. 3R. 17p. | 3A. 1R. 30p. |
| <u>4</u> | <u>4</u> |
| 1463R. | 13R. |
| <u>40</u> | <u>40</u> |
| 58537p. | 550p. |
| <u>1.75</u> | <u>272<u>1</u>₄</u> |
| Ans. \$ 102,439.75 | 149737 <u>1</u> ₂ ft. <u>1.25</u> |
| | Ans. \$ 187171.87,5 |

| (7.) | (8.) | (9.) |
|--------------|--------------------------------|-----------------|
| 12m. | 18A. 0R. 16p. | 48A. 3R. 14p. |
| <u>12</u> | <u>4</u> | <u>4</u> |
| 144 sq. m. | 72R. | 195R. |
| <u>640</u> | <u>40</u> | <u>40</u> |
| Ans. 92160A. | 2896p. | 7814p. |
| | <u>272<u>1</u>₄</u> | <u>.90</u> |
| | Ans. 788436 sq. ft. | Ans. \$ 7032.60 |

(ART. 94, p. 99.)

| (3.) | (4.) | (5.) |
|------------------------------|----------------------|------------------------------|
| 45C. | 1728)9953280 cu. in. | 15ft. |
| <u>128</u> | <u>128)</u> 5760ft. | <u>4</u> |
| 5760ft. | Ans. 45C. | <u>60</u> |
| <u>1728</u> | | <u>6<u>1</u>₄</u> |
| 9953280 cu. in., Ans. | | 128)390 cu. ft. |
| | | Ans. 3C. 6ft. |
| (6.) | (7.) | |
| 4ft. | | |
| <u>3<u>1</u>₄</u> | <u>14</u> | |
| <u>13</u> | <u>12</u> | |
| <u>2</u> | <u>168</u> | |
| 26 cu. ft. | <u>8</u> | |
| 1728 | Ans. 1344 cu. ft. | |
| Ans. 44928 cu. in. | | |

(ART. 95, p. 100.)

(3.)

197 tuns 3hhd. 60gal. 3qt. 1pt.

| | |
|-------------------------------|---|
| $\frac{4}{791\text{hhd.}}$ | (4.) |
| $\frac{63}{49893\text{gal.}}$ | 4) <u>1596604</u> gi. |
| $\frac{4}{199575\text{qt.}}$ | 2) <u>399151</u> pt. |
| $\frac{2}{399151\text{pt.}}$ | 4) <u>199575</u> qt. 1pt. |
| $\frac{4}{}$ | 63) <u>49893</u> gal. 3qt. |
| | 4) 791hhd. 60gal. |
| | Ans. 197 tuns 3hhd. 60gal. [3qt. 1pt.] |

Ans. 1596604gi.

(5.)

| |
|----------------------------|
| $\frac{7}{441\text{gal.}}$ |
| $\frac{4}{1764\text{qt.}}$ |
| $\frac{2}{3528\text{pt.}}$ |
| $\frac{.05}{}$ |

Ans. \$ 176.40

(6.)

| |
|------------------------------|
| 18 tuns 1hhd. 47gal. |
| $\frac{4}{73\text{hhd.}}$ |
| $\frac{63}{4646\text{gal.}}$ |
| $\frac{1.25}{}$ |

Ans. \$ 5807.50

(ART. 96, p. 102.)

(3.)

4 tuns 1hhd. 17gal. 0qt. 1pt.

| | | | |
|-----------------------------|------------------------------------|-----------------------------|-----------------------------|
| $\frac{4}{17\text{hhd.}}$ | (4.) | (5.) | (6.) |
| $\frac{54}{935\text{gal.}}$ | 2) <u>7481</u> pt. | $\frac{54}{396\text{gal.}}$ | $\frac{18}{972\text{gal.}}$ |
| $\frac{4}{3740\text{qt.}}$ | 4) <u>3740</u> qt. 1pt. | $\frac{4}{1584\text{qt.}}$ | $\frac{54}{.15}$ |
| $\frac{2}{7481\text{pt.}}$ | 54) <u>935</u> gal. | $\frac{.04}{}$ | Ans. \$ 145.80 |
| | 4) 17hhd. 17gal. | \$ 63.36 | Ans. |
| | | | |
| 7481pt. Ans. | Ans. 4 tuns 1hhd. 17gal. 0qt. 1pt. | | |

(ART. 97, p. 103.)

| (3.) | (4.) |
|---------------------------|--|
| 97ch. 30bu. 2pk. 36 | 8) <u>112720</u> qt. |
| <u>3522</u> bu. 4 | 4) <u>14090</u> pk. |
| <u>14090</u> pk. 8 | 36) <u>3522</u> bu. 2pk. Ans. 97ch. 30bu. [2pk.] |
| <u>112720</u> qt., Ans. | <u>1120</u> qt. 2 <u>2241</u> pt., Ans. |
| (5.) | (7.) |
| 2) <u>2241</u> pt. | 18qr. 0bu. 3pk. 5qt. 8 |
| 8) <u>1120</u> qt. 1pt. | <u>144</u> bu. 4) <u>140</u> pk. |
| Ans. 35bu. 0pk. 0qt. 1pt. | <u>579</u> pk. 8 <u>4637</u> qt. |
| | Ans. 18qr. 0bu. 3pk. [5qt.] |
| (9.) | (10.) |
| 19bu. 3pk. 7qt. 1pt. 4 | 2) <u>1279</u> pt. |
| <u>79</u> pk. 8 | 8) <u>639</u> qt. 1pt. 4) <u>79</u> pk. 7qt. |
| <u>639</u> qt. 2 | Ans. 19bu. 3pk. 7qt. 1pt. |
| Ans. <u>1279</u> pt. | |

(ART. 98, p. 105.)

| (3.) | (4.) |
|------------------------|-------------------------|
| 296da. 18h. 32m. 24 | 60) <u>427352</u> m. |
| <u>7122</u> h. 60 | 24) <u>7122</u> h. 32m. |
| Ans. <u>427352</u> m. | Ans. 296da. 18h. 32m. |

(5.)

365da. 5h. 48m. 57sec.

248765h.60525948m.6031556937sec.

30 years.

946708110

22699722sec.

Ans. 969407832sec.

262da. 17h. 28m. 42sec.

246305h.60378328m.6022699722sec.

(6.)

365da. 5h. 48m. 57sec. 31556937)969407832(30 years.

248765h.60525948m.6094670811060)22699722sec.60)378328m. 42sec.24)6305h. 28m.

262da. 17h.

31556937 seconds in a solar year.

Ans. 30y. 262da. 17h. 28m. 42sec.

(7.)

60)684592m.

(8.)

67w. 6da. 9h. 52m.

24)11409h. 52m.77)475da. 9h.

475da.

24

Ans. 67w. 6da. 9h. 52m.

11409h.60

Ans. 684592m.

(ART. 99, p. 106.)

(3.)

27S. 19° 51' 28"

30829°6049791'60Ans. 2987488"

(4.)

60)2987488"

6049791' 28"30829° 51'

Ans. 27S. 19° 51' 28"

MISCELLANEOUS EXERCISES.

1. (p. 107.) $\$ 345 \times 100 = 34500$; $34500 + 18 = 34518$;
 $34518 \times 10 = 345180$ mills, Ans.
2. 345180 mills $\div 10 = 34518$; $34518 \div 100 = \$ 345.18$, Ans.
3. $46\text{£.} \times 20 = 920\text{s.}$; $920\text{s.} + 18\text{s.} = 938\text{s.}$; $938\text{s.} \times 12 = 11256\text{d.}$; $11256\text{d.} + 5\text{d.} = 11261\text{d.}$; $11261\text{d.} \times 4 = 45044\text{qr.}$ Ans.
4. $45044\text{qr.} \div 4 = 11261\text{d.}$; $11261\text{d.} \div 12 = 938\text{s. } 5\text{d.}$; $938\text{s.} \div 20 = 46\text{£. } 18\text{s. } 5\text{d.}$ Ans.
5. $61\text{lb.} \times 12 = 732\text{oz.}$; $732\text{oz.} \times 20 = 14640\text{dwt.}$; $14640\text{dwt.} + 17\text{dwt.} = 14657\text{dwt.}$; $14657\text{dwt.} \times 24 = 351768\text{gr.}$; $351768\text{gr.} + 17\text{gr.} = 351785\text{gr.}$ Ans.
6. $351785\text{gr.} \div 24 = 14657\text{dwt. } 17\text{gr.}$; $14657\text{dwt.} \div 20 = 732\text{oz. } 17\text{dwt.}$; $732\text{oz.} \div 12 = 61\text{lb. } 0\text{oz. } 17\text{dwt. } 17\text{gr.}$ Ans.
7. $27\text{lb} \times 12 = 324\text{5}$; $324\text{5} + 3\text{5} = 327\text{5}$; $327\text{5} \times 8 = 26163$; $26163 + 1\text{3} = 26173$; $26173 \times 3 = 7851\text{D}$; $7851\text{D} + 1\text{D} = 7852\text{D}$ Ans.
8. $7852\text{D} \div 3 = 26173\text{ } 1\text{D}$; $26173 \div 8 = 327\text{5 } 1\text{3}$; $327\text{5} \div 12 = 27\text{lb } 3\text{5 } 1\text{3 } 1\text{D}$ Ans.
9. $83\text{T.} \times 20 = 1660\text{cwt.}$; $1660\text{cwt.} + 11\text{cwt.} = 1671\text{cwt.}$; $1671\text{cwt.} \times 4 = 6684\text{qr.}$; $6684\text{qr.} + 3\text{qr.} = 6687\text{qr.}$; $6687\text{qr.} \times 28 = 187236\text{lb.}$; $187236\text{lb.} + 18\text{lb.} = 187254\text{lb.}$; $187254\text{lb.} \times 16 = 2996064\text{oz.}$ Ans.
10. $2996064\text{oz.} \div 16 = 187254\text{lb.}$; $187254\text{lb.} \div 28 = 6687\text{qr.}$
 $18\text{lb.} ; 6687\text{qr.} \div 4 = 1671\text{cwt. } 3\text{qr.}$; $1671\text{cwt.} \div 20 = 83\text{T. } 11\text{cwt. } 3\text{qr. } 18\text{lb.}$ Ans.
11. $97\text{yd.} \times 4 = 388\text{qr.}$; $388\text{qr.} + 3\text{qr.} = 391\text{qr.}$; $391\text{qr.} \times 4 = 1564\text{na.}$; $1564\text{na.} + 3\text{na.} = 1567\text{na.}$ Ans.
12. $1567\text{na.} \div 4 = 391\text{qr. } 3\text{na.}$; $391\text{qr.} \div 4 = 97\text{yd. } 3\text{qr. } 3\text{na.}$ Ans.
13. $57\text{ E. E.} \times 5 = 285\text{qr.}$; $285\text{qr.} \div 4 = 71\text{yd. } 1\text{qr.}$ Ans.
14. $71\text{yd.} \times 4 = 284\text{qr.}$; $284\text{qr.} + 1\text{qr.} = 285\text{qr.}$; $285\text{qr.} \div 5 = 57\text{ E. E.}$ Ans.

15. $15\text{m.} \times 8 = 120\text{fur.}$; $120\text{fur.} + 7\text{fur.} = 127\text{fur.}$; $127\text{fur.} \times 40 = 5080\text{rd.}$; $5080\text{rd.} + 18\text{rd.} = 5098\text{rd.}$; $5098\text{rd.} \times 16\frac{1}{2} = 84117\text{ft.}$; $84117\text{ft.} + 10\text{ft.} = 84127\text{ft.}$; $84127\text{ft.} \times 12 = 1009524\text{in.}$; $1009524\text{in.} + 6\text{in.} = 1009530\text{in.}$ Ans.
16. $1009530\text{in.} \div 12 = 84127\text{ft. 6in.}$; $84127\text{ft.} + 16\frac{1}{2} = 5098\text{rd.}$
 $10\text{ft.} ; 5098\text{rd.} \div 40 = 127\text{fur. 18rd.}$; $127\text{fur.} + 8 = 15\text{m.}$
 $7\text{fur. 18rd. 10ft. 6in.}$ Ans.
17. $95,000,000 \text{ miles} \times 8 = 760000000 \text{ furlongs}$; $760000000 \text{ furlongs} \times 40 = 30400000000 \text{ rods}$; $30400000000 \text{ rods} \times 16\frac{1}{2} = 501600000000 \text{ feet}$; $501600000000 \text{ feet} \times 12 = 6,019,200,000,000 \text{ inches}$, Ans.
18. $6,019,200,000,000\text{in.} \div 12 = 501600000000\text{ft.}$; $501600000000\text{ft.} \div 16\frac{1}{2} = 304000000000\text{rd.}$; $304000000000\text{rd.} \div 40 = 760000000\text{fur.}$; $760000000\text{fur.} \div 8 = 95,000,000 \text{ miles}$, Ans.
19. $48\text{deg.} \times 69\frac{1}{2} = 3336\text{m.}$; $3336\text{m.} + 18\text{m.} = 3354\text{m.}$
 $3354\text{m.} \times 8 = 26832\text{fur.}$; $26832\text{fur.} + 7\text{fur.} = 26839\text{fur.}$
 $26839\text{fur.} \times 40 = 1073560\text{rd.}$; $1073560\text{rd.} + 18\text{rd.} = 1073578\text{rd.}$; $1073578\text{rd.} \times 16\frac{1}{2} = 17714037\text{ft.}$ Ans.
20. $17714037\text{ft.} \div 16\frac{1}{2} = 1073578\text{rd.}$; $1073578\text{rd.} \div 40 = 26839\text{fur. 18rd.}$; $26839\text{fur.} + 8 = 3354\text{m. 7fur.}$; $3354\text{m.} \div 69\frac{1}{2} = 48\text{deg. 18m. 7fur. 18rd.}$ Ans.
21. $7\text{A.} \times 4 = 28\text{R.}$; $28\text{R.} + 3\text{R.} = 31\text{R.}$; $31\text{R.} \times 40 = 1240\text{p.}$; $1240\text{p.} + 16\text{p.} = 1256\text{p.}$; $1256\text{p.} \times 272\frac{1}{4} = 341946\text{ft.}$; $341946\text{ft.} + 218\text{ft.} = 342164\text{ft.}$ Ans.
22. $342164\text{ft.} \div 272\frac{1}{4} = 1256\text{p. 218ft.}$; $1256\text{p.} + 40 = 31\text{R.}$
 $16\text{p.} ; 31\text{R.} \div 4 = 7\text{A. 3R. 16p. 218ft.}$ Ans.
23. $25\text{ S. M.} \times 640 = 16000\text{A.}$; $16000\text{A.} \times 160 = 2560000\text{p.}$
 $2560000\text{p.} \times 272\frac{1}{4} = 696960000\text{ft.}$; $696960000\text{ft.} \times 144 = 100362240000\text{in.}$ Ans.
24. $100362240000\text{in.} \div 144 = 696960000\text{ft.}$; $696960000\text{ft.} \div 272\frac{1}{4} = 2560000\text{p.}$; $2560000\text{p.} \div 160 = 16000\text{A.}$
 $16000\text{A.} \div 640 = 25 \text{ square miles}$, Ans.
25. $15\text{T.} \times 40 = 600\text{ft.}$; $600\text{ft.} \times 1728 = 1036800\text{in.}$ Ans.
26. $1036800\text{in.} \div 1728 = 600\text{ft.}$; $600\text{ft.} \div 40 = 15\text{T.}$ Ans.

27. 5hhd. \times 63 = 315gal. ; 315gal. + 17gal. = 332gal. ;
 332gal. \times 4 = 1328qt. ; 1328qt. + 3qt. = 1331qt. ;
 1331qt. \times 2 = 2662pt. ; 2662pt. \times 4 = 10648 gills, Ans.
28. 10648gi. \div 4 = 2662pt. ; 2662pt. \div 2 = 1331qt. ; 1331qt.
 \div 4 = 332gal. 3qt. ; 332gal. \div 63 = 5hhd. 17gal. 3qt.
 Ans.
29. 29hhd. \times 54 = 1566gal. ; 1566gal. + 30gal. = 1596gal. ;
 1596gal. \times 4 = 6384qt. ; 6384qt. + 3qt. = 6387qt. Ans.
30. 6387qt. \div 4 = 1596gal. 3qt. ; 1596gal. \div 54 = 29hhd.
 30gal. 3qt. Ans.
31. 15ch. \times 36 = 540bu. ; 540bu. + 16bu. = 556bu. ; 556bu.
 \times 4 = 2224pk. ; 2224pk. + 3pk. = 2227pk. ; 2227pk.
 \times 8 = 17816qt. ; 17816qt. \times 2 = 35632pt. Ans.
32. 35632pt. \div 2 = 17816qt. ; 17816qt. \div 8 = 2227pk. ;
 2227pk. \div 4 = 556bu. 3pk. ; 556bu. + 36 = 15ch. 16bu.
 3pk. Ans.
33. 365da. \times 24 = 8760h. ; 8760h. + 6h. = 8766h. ; 8766h. \times
 60 = 525960m. ; 525960m. \times 60 = 31557600sec. Ans.
34. 31557600sec. + 60 = 525960m. ; 525960m. \div 60 =
 8766h. ; 8766h. \div 24 = 365da. 6h. Ans.
35. 365da. \times 24 = 8760h. ; 8760h. + 6h. = 8766h. ; 8766h.
 \times 1842 = 16146972h. Ans.
36. 16146972h. \div 8766 = 1842 years, Ans.
37. 8S. \times 30 = 240° ; $240^\circ + 14^\circ = 254^\circ$; $254^\circ \times 60 =$
 $15240'$; $15240' + 18'' = 15258'$; $15258' \times 60 = 915480''$;
 $915480'' + 17'' = 915497''$, Ans.
38. $915497'' + 60 = 15258' 17''$; $15258' + 60 = 254^\circ 18'$;
 $254^\circ + 30 = 88. 14^\circ 18' 17''$, Ans.
39. $13 \times 144 \times .02\frac{1}{2} = \46.80 , Ans.
40. $12 \times 20 \times .20 = \48.00 , Ans.
41. 2hhd. \times 63 \times 4 = 504qt. ; 504qt. + 3 = 168 bottles, Ans.
42. $\$1480.00 \div 25 = \59.20 ; $\$59.20 \div 160 = \0.37 , cost
 of 1p. ; 37A. 2R. 18p. = 6018p. ; $\$0.37 \times 6018 =$
 $\$2226.66$, Ans.
43. 5cwt. 3qr. 18lb. = 662lb. ; 662lb. \times $\$0.09 = \59.58 ;

- $\$1.75 \times 25 = \43.75 ; $\$59.58 - \$43.75 = \$15.83$,
Ans.
44. 2lb. 7oz. = 31oz.; $\$46.50 \div 31 = \1.50 , price per oz.;
 $\$1.50 \times 12 = \18.00 , price per pound, Ans.
45. 3T. 1cwt. 18lb. = 6850lb.; $6850\text{lb.} \times \$0.12 = \822.00 ;
 $6850\text{lb.} \times \$0.09 = \616.50 ; $\$822.00 - \$616.50 = \$205.50$, Ans.
46. 37m. 7fur. 29rd. = 12149rd.; $12149\text{rd.} \times \$5.75 = \69856.75 , Ans.
47. 15m. 6fur. 37rd. = 5077rd.; $5077\text{rd.} \times \$17.29 = \$87,781.33$, Ans.
48. 40p. 200ft. = 11090ft.; $11090\text{ft.} \times \$1.50 = \$16,635$, Ans.
49. 18ft. \times 15ft. = 270 sq. ft.; $270 \text{sq. ft.} \div 9 = 30\text{yd}$. Ans.
50. 47da. \times 10 = 470h.; $470\text{h.} + 7\text{h.} = 477\text{h.} = 28620\text{m.}$
 $28620 \times 120 = 3434400$ nails, Ans.
51. 80rd. \times 50rd. = 4000 sq. rd.; $4000 \text{sq. rd.} \div 160 = 25$ acres, Ans.
52. $18000000 \div 90 = 200000\text{m.} = 138\text{da. } 21\text{h. } 20\text{m.}$ Ans.
53. $9 \times 15 \times 23 = 3105\text{yd.}; 3105 \times \$0.08 = \$248.40$, Ans.
54. 6m. $\times 4\frac{1}{2}\text{m.} = 27 \text{sq. m.}; 27 \text{sq. m.} = 17280\text{A.}; 17280 \div 90 = 192$ lots, Ans.
55. $196\text{d. } 49\text{m.} = 282289\text{m.}; 282289 \times 47 = 13267583$ times,
Ans.
56. $36\text{ft.} \times 16\text{ft.} = 576 \text{sq. ft.}; 576 \text{sq. ft.} \times 2 = 1152 \text{sq. ft.}$
 $= 165888\text{in.}; 165888\text{in.} \div 27 = 6144$ shingles, Ans.
57. $110\text{m.} = 6969600\text{in.}; 12\text{ft. } 6\text{in.} = 150\text{in.}; 6969600 \div 150 = 46464$ times, Ans.
58. $25 \times 7 \times 5 \times 12 \times 15 \times 178 = 28035000$; $28035000 \times \$4.84 = \135689400 , Ans.
59. $18 \times 5\frac{1}{2} = 99\text{yd.}; 99\text{yd.} + 5\text{yd.} = 104\text{yd.}; 104\text{yd.} \times 3 = 312\text{ft.}; 312\text{ft.} + 2\text{ft.} = 314\text{ft.}; 314\text{ft.} \times 12 = 3768\text{in.}; 3768\text{in.} + 11\text{in.} = 3779\text{in.}$ Ans.
60. $3779\text{in.} \div 12 = 314\text{ft. } 11\text{in.}; 314\text{ft.} \div 3 = 104\text{yd. } 2\text{ft.}; 104\text{yd.} \div 5\frac{1}{2} = 18\text{rd. } 5\text{yd. } 2\text{ft. } 11\text{in.}$ Ans.
61. 5T. 17cwt. 3qr. 18lb. = 13206lb.; $13206 \times \$0.03 = \396.18 , Ans.

62. 25rd. \times 16rd. = 400 sq. rd. = 108900 sq. ft.; 108900 \times
 $\$1.25 = \$136,125$; $\$136,125 - \$100,000 = \$36,125$,
 Ans.
-

ADDITION OF COMPOUND NUMBERS.

(ART. 101, p. 111.)

- | | |
|---|---|
| 3. 120£. 5s. 9d. 3qr. | 9. 102T. 1cwt. 3qr. 9lb. 15oz. 10dr. |
| 5. 191lb. 1oz. 19dwt. 15gr. | 11. 189 E. E. 0qr. 1na. 1 $\frac{1}{4}$ in. |
| 7. 234lb 1 $\frac{1}{2}$ 23 1 $\frac{1}{2}$ 12gr. | |

$$13. 74m. 3fur. 39rd. 2\frac{1}{2}yd. \quad 2ft. 6in.$$

$$\frac{1}{2}yd. = 1ft. 6in.$$

$$74m. 3fur. 39rd. 3yd. \quad 1ft. 0in.$$

$$15. 179m. 0fur. 6cha. 3p. 18li.$$

$$17. 162A. 0R. 2p. 17\frac{1}{2}yd. \quad 4ft. 83in.$$

$$\frac{1}{2}yd. = 2ft. 36in.$$

$$162A. 0R. 2p. 17yd. \quad 6ft. 119in.$$

- | | |
|-------------------------------------|---------------------------------|
| 19. 213C. 110ft. 1455in. | 25. 211ch. 19bu. 3pk. 1qt. 1pt. |
| 21. 193 tun 2hhhd. 27gal. 2qt. 0pt. | 27. 256w. 4da. 3h. 39m. 19s. |
| 23. 211 tun 0hhd. 53gal. 1qt. 1pt. | 29. 11S. 0° 30' 21". |
-

SUBTRACTION OF COMPOUND NUMBERS.

(ART. 102, p. 115.)

- | | |
|------------------------|------------------------------|
| 3. 51£. 18s. 10d. 2qr. | 9. 1T. 2cwt. 0qr. 27lb. 3oz. |
|------------------------|------------------------------|

$$14qr.$$

- | | |
|----------------------------|---|
| 5. 691lb. 9oz. 4dwt. 22gr. | 11. 151 E. E. 4qr. 2na. 1 $\frac{1}{4}$ in. |
|----------------------------|---|

- | |
|---|
| 7. 63lb 11 $\frac{1}{2}$ 13 1 $\frac{1}{2}$ 19gr. |
|---|

$$13. 8deg. 59\frac{1}{2}m. \quad 1fur. 39rd. 2\frac{1}{2}ft. \quad 10in.$$

$$\frac{1}{2}m. = 4fur. \quad \frac{1}{2}ft. = 6in.$$

$$8deg. 59m. \quad 5fur. 39rd. 3ft. \quad 2in.$$

$$15. 13m. 5fur. 3cha. 1p. 21li.$$

$$17. 41A. 1R. 38p. 18\frac{1}{2}yd. \quad 8ft. 143in.$$

$$\frac{1}{2}yd. = 2ft. 36in.$$

$$41A. 1R. 38p. 19yd. \quad 2ft. 35in.$$

19. 371C. 126ft. 1683in.
 21. 61 tun 1hhd. 60gal. 1qt. 1pt. 2gi.
23. 59 tun 2hhd. 42gal. 2qt. 1pt.
 25. 53ch. 31bu. 1pk. 5qt. 0pt.
 27. 4w. 1da. 9h. 26m. 27sec.

(ART. 103, p. 118.)

| (2.) | (3.) | (4.) | (5.) |
|------------|------------|------------|------------|
| y. mo. da. | y. mo. da. | y. mo. da. | y. mo. da. |
| 1847 0 6 | 1837 3 25 | 1848 1 23 | 1845 5 8 |
| 1843 2 21 | 1832 10 15 | 1767 6 11 | 1767 2 15 |
| 3 9 15 | 4 5 10 | 80 7 12 | 78 2 23 |

MISCELLANEOUS EXERCISES IN ADDITION AND SUBTRACTION OF COMPOUND NUMBERS.

(PAGE 119.)

| (1.) | (2.) | (3.) |
|------------------|------------------|---------------------|
| lb. oz. dwt. gr. | lb. ɔ. ʒ. D. gr. | T. cwt. qr. lb. oz. |
| 4 8 13 8 | 7 3 2 2 1 | 17 11 3 11 12 |
| 5 11 19 23 | 2 10 0 1 13 | 11 17 1 19 11 |
| 8 0 17 15 | 2 3 7 2 17 | 53 19 1 17 8 |
| 18 9 14 10 | 12 5 3 0 11 | 27 19 3 18 9 |
| 37 7 5 8 | | 16 3 3 0 13 |
| | | 127 12 1 12 5 |

| (4.) | (5.) | (6.) |
|-----------|------------------|------------------|
| £. s. d. | lb. oz. dwt. gr. | lb. ɔ. ʒ. D. gr. |
| 7671 0 0 | 73 0 0 0 | 71 8 1 1 17 |
| 1728 17 9 | 26 11 13 14 | 7 9 1 1 17 |
| 5942 2 3 | 46 0 6 10 | 63 10 7 2 17 |

| (7.) | (8.) | (9.) |
|---------------------|-------------|-----------------|
| T. cwt. qr. lb. oz. | yd. qr. na. | T. cwt. qr. lb. |
| 28 13 0 0 0 | 37 3 3 | 2 13 1 17 |
| 10 17 0 19 14 | 18 1 3 | 3 0 0 27 |
| 17 15 3 8 2 | 31 1 2 | 1 0 3 11 |
| | 87 3 0 | 6 14 1 27 |

(10.)

| m. | ftr. | rd. | ft. | in. |
|-----|------|-----|-----------------|-----|
| 16 | 7 | 18 | 14 | 11 |
| 19 | 1 | 13 | 16 | 9 |
| 97 | 3 | 27 | 13 | 3 |
| 47 | 5 | 37 | 13 | 10 |
| 181 | 2 | 18 | 8 $\frac{1}{2}$ | 9 |
| | | | $\frac{1}{2}=6$ | |

181 2 18 9 3

NOTE. As $8\frac{1}{2}$ feet and 9 inches are equal to 8 feet and 15 inches, so we find 8 feet 15 inches equal to 9 feet 3 inches.

(13.)

| A. | R. | P. | ft. | in. |
|-----|----|----|------------------|-----|
| 144 | 3 | 0 | 0 | 0 |
| 18 | 1 | 17 | 200 | 100 |
| 126 | 1 | 22 | 71 $\frac{1}{2}$ | 44 |
| | | | $\frac{1}{2}=36$ | |

126 1 22 71 80

NOTE. The $\frac{1}{2}$ of a foot, which is 36 inches, is added to the 44 inches, and their sum is 80 inches.

(11.)

| yd. | qt. | na. |
|-----|-----|-----|
| 76 | 0 | 0 |
| 18 | 3 | 2 |

 $\frac{1}{2}=6$

57 0 2

16 3 21

 $\frac{1}{2}=4$

16 3 21

 $\frac{1}{2}=6$

(12.)

| m. | ftr. | rd. | ft. | in. |
|----|------|-----|-----------------|-----|
| 20 | 0 | 0 | 0 | 0 |
| 3 | 4 | 18 | 13 | 8 |
| 16 | 3 | 21 | 2 $\frac{1}{2}$ | 4 |

16 3 21 2 10

NOTE. The half foot, which is 6 inches, is added to the 4 inches, and their sum is 10 inches.

(14.)

| cord. | ft. | in. |
|-------|-----|------|
| 18 | 0 | 0 |
| 3 | 100 | 1000 |

14 27 728

574 3 20 12 $\frac{1}{2}$

(15.)

| A. | R. | P. | ft. |
|-----|----|----|-----|
| 169 | 3 | 15 | 227 |
| 187 | 1 | 15 | 165 |
| 217 | 2 | 28 | 165 |

574 3 20 12 $\frac{1}{2}$

(16.)

| cord. | ft. | in. |
|-------|-----|------|
| 18 | 116 | 1000 |
| 17 | 111 | 1600 |
| 21 | 109 | 1716 |

58 82 860

(17.)

| T. | ft. | in. |
|----|-----|-----|
| 17 | 0 | 0 |
| 5 | 18 | 765 |

11 21 963

(18.)

| gal. | qt. | pt. |
|------|-----|-----|
| 169 | 0 | 0 |
| 76 | 3 | 1 |

92 0 1

(19.)

| ch. | bu. | pk. | qt. |
|-----|-----|-----|-----|
| 17 | 18 | 0 | 0 |
| 5 | 20 | 1 | 7 |

11 33 2 1

(20.)

| y. | mo. | d. | h. | m. | s. |
|----|-----|----|----|----|----|
| 83 | 0 | 0 | 0 | 0 | 0 |
| 47 | 10 | 27 | 18 | 50 | 14 |

35 1 2 5 9 46

(21.)

| s. | ° | ' | " |
|----|----|----|----|
| 11 | 15 | 36 | 15 |
| 5 | 18 | 50 | 18 |

5 26 45 57

(22.)

| gal. | qt. | pt. |
|------|-----|-----|
| 167 | 3 | 1 |
| 186 | 1 | 1 |
| 108 | 2 | 1 |
| 123 | 3 | 0 |

586 2 1

| (23.) | | | | (24.) | | | (25.) | | | | |
|-------|-----|-----|-----|-------|-----|----|-------|-----|----|----|----|
| bu. | pk. | qt. | pt. | y. | mo. | d. | y. | d. | h. | m. | s. |
| 17 | 1 | 7 | 1 | 13 | 4 | 13 | 18 | 345 | 13 | 37 | 15 |
| 18 | 3 | 2 | 0 | 12 | 11 | 23 | 87 | 169 | 12 | 16 | 28 |
| 19 | 1 | 3 | 1 | 18 | 9 | 29 | 316 | 144 | 20 | 53 | 18 |
| 51 | 3 | 0 | 1 | 45 | 2 | 5 | 13 | 360 | 21 | 57 | 15 |
| 107 | 1 | 5 | 1 | | | | 436 | 290 | 20 | 44 | 16 |

| (27.) | | | | (28.) | | |
|-------|-----|------|-----|-------|-----|-----|
| lb. | oz. | dwt. | gr. | yd. | qr. | in. |
| 106 | 0 | 0 | 0 | 17 | 3 | 0 |
| 5 | 11 | 12 | 15 | 3 | 3 | 2 |
| 3 | 0 | 13 | 14 | 4 | 1 | 3 |
| 7 | 11 | 14 | 23 | | | |
| 17 | 0 | 1 | 4 | 8 | 1 | 1 |
| 88 | 11 | 18 | 20 | 9 | 1 | 3 |

| (29.) | | | | (30.) | | | |
|-------|----|----|----|-------|----|----|----|
| s. | o. | ' | " | s. | o. | ' | " |
| 3 | 18 | 45 | 15 | 3 | 18 | 14 | 35 |
| 7 | 15 | 36 | 18 | 11 | 25 | 30 | 50 |
| 5 | 21 | 38 | 27 | 3 | 22 | 43 | 45 |
| 4 | 26 | 0 | 0 | | | | |

NOTE. As this question is in Motion, it is necessary to reject the 12s in the sum of the signs.

NOTE. To perform this question, we add 12 signs to the longitude of the star, and, from their sum subtract the longitude of the planet, because all the planets move eastward, as seen from the sun.

MULTIPLICATION OF COMPOUND NUMBERS.

(ART. 106, p. 124.)

| (3.) | | | (4.) | | |
|------|------|-----|----------------------------|------|------------------------------|
| m. | fur. | rd. | T. | cwt. | lb. |
| 3 | 7 | 18 | $30 \times 5 = 5 \times 6$ | 2 | $18 \times 84 = 7 \times 12$ |
| | | 5 | | 7 | |
| 19 | 5 | 10 | 16 | 15 | 14 |
| | 6 | | | 12 | |
| 117 | 7 | 20 | 201 | 4 | 0 |

$$\begin{array}{r}
 \text{(5.)} \\
 \begin{array}{r}
 \text{yd. gr. na.} \\
 7 \quad 3 \quad 2 \times 72 = 6 \times 12 \\
 \underline{6} \\
 \hline
 47 \quad 1 \quad 0 \\
 \underline{12} \\
 \hline
 567 \quad 0 \quad 0
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(6.)} \\
 \begin{array}{r}
 \text{yd. gr. na.} \\
 3 \quad 2 \quad 1 \times 132 = 12 \times 11 \\
 \underline{12} \\
 \hline
 42 \quad 3 \quad 0 \\
 \underline{11} \\
 \hline
 470 \quad 1 \quad 0
 \end{array}
 \end{array}
 \end{array}$$

(ART. 107, p. 125.)

NOTE. It is sometimes more convenient to use as multipliers the nearest composite numbers than to follow the Rule.

$$\begin{array}{r}
 \text{(2.)} \\
 \begin{array}{r}
 \text{lb. oz. dr.} \\
 17 \quad 10 \quad 13 \times 2 \\
 \underline{10} \\
 \hline
 176 \quad 12 \quad 2 \\
 \underline{6} \\
 \hline
 1060 \quad 8 \quad 12 = 60 \\
 35 \quad 5 \quad 10 = 2
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(3.)} \\
 \begin{array}{r}
 \text{£ s. d.} \\
 2 \quad 17 \quad 9\frac{1}{2} \times 7 \\
 \underline{10} \\
 \hline
 28 \quad 17 \quad 11 \\
 \underline{9} \\
 \hline
 260 \quad 1 \quad 3 = 90 \\
 20 \quad 4 \quad 6\frac{1}{2} = 7
 \end{array}
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(4.)} \\
 \begin{array}{r}
 \text{m. fur. rd. yd. ft. in.} \\
 17 \quad 3 \quad 19 \quad 3 \quad 2 \quad 7 \times 8 \\
 \underline{10} \\
 \hline
 174 \quad 2 \quad 36 \quad 5 \quad 1 \quad 10 \\
 \underline{3} \\
 \hline
 523 \quad 0 \quad 30 \quad 5 \quad 2 \quad 6 = 30 \\
 139 \quad 3 \quad 37 \quad 2\frac{1}{2} \quad 2 \quad 8 = 8
 \end{array}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{(5.)} \\
 \begin{array}{r}
 \text{bu. pk. qt. pt.} \\
 27 \quad 3 \quad 6 \quad 1 \times 8 \\
 \underline{10} \\
 \hline
 279 \quad 2 \quad 1 \quad 0 \\
 \underline{9} \\
 \hline
 2515 \quad 3 \quad 1 \quad 0 = 90 \\
 223 \quad 2 \quad 4 \quad 0 = 8
 \end{array}
 \qquad
 \begin{array}{r}
 \text{(6.)} \\
 \begin{array}{r}
 \text{yd. gr. na.} \\
 7 \quad 3 \quad 2 \times 7 \\
 \underline{10} \\
 \hline
 78 \quad 3 \quad 0 \times 4 \\
 \underline{10} \\
 \hline
 787 \quad 2 \quad 0 \\
 \underline{3} \\
 \hline
 2362 \quad 2 \quad 0 = 300 \\
 315 \quad 0 \quad 0 = 40 \\
 55 \quad 0 \quad 2 = 7
 \end{array}
 \end{array}
 \end{array}$$

| (7.) | | | | | | (8.) | | | | | |
|------|----|----|------------------|-----|-------|------|------|-----|-----|--------|--|
| A. | R. | p. | yd. | ft. | in. | T. | cwt. | qr. | lb. | oz. | |
| 13 | 3 | 14 | 18 | 7 | 76×1 | 17 | 14 | 3 | 18 | 14×1 | |
| | | | | 9 | | | | | 10 | | |
| 124 | 2 | 11 | 17 $\frac{3}{4}$ | 4 | 108 | 177 | 9 | 0 | 20 | 12×5 | |
| | | | 2 | | | | | | 10 | | |
| 249 | 0 | 23 | 6 $\frac{1}{4}$ | 0 | 72=18 | 1774 | 11 | 3 | 11 | 8 | |
| 13 | 3 | 14 | 18 | 7 | 76=1 | | | | | 4 | |
| 262 | 3 | 37 | 24 $\frac{1}{4}$ | 8 | 4=19 | 7098 | 7 | 1 | 18 | 0=400 | |
| | | | $\frac{1}{4}=2$ | 36 | | 887 | 5 | 3 | 19 | 12= 50 | |
| 262 | 3 | 37 | 25 | 1 | 40=19 | 17 | 14 | 3 | 18 | 14= 1 | |
| | | | | | | 8003 | 8 | 1 | 0 | 10=451 | |

DIVISION OF COMPOUND NUMBERS.

(ART. 110, p. 127.)

| (2.) | | | (3.) | | | (4.) | | |
|--------|------|------|-------|---|------|--------|----|--------|
| 6)6409 | 10 | 0 | 5)117 | 7 | 20 | 12)201 | 4 | 2 0 |
| 6) | 1068 | 5 0 | 6)23 | 4 | 28 | 7)16 | 15 | 1 14 |
| 10) | 178 | 0 10 | | 3 | 7 18 | | 2 | 7 3 18 |
| | 17 | 16 1 | | | | | | |

| (5.) | | | (6.) | | |
|-------|-----|-----|--------|-----|-----|
| 6)567 | yd. | qr. | 12)470 | yd. | qr. |
| | 0 | 0 | | 1 | 0 |
| 12)94 | 2 | 0 | 11)39 | 0 | 3 |
| | 7 | 3 2 | | 3 | 2 1 |

| (2.) | (AET. 111, p. 128.) | (3.) |
|-----------------------|--------------------------|-------------------------|
| 62) 1085 | oz. dr. 14 6(17lb.) | 97) 280 |
| 62 | | 5 9 $\frac{1}{4}$ (2£.) |
| 475 | | 194 |
| 434 | | 86 |
| 41 | | 20 |
| 16 | m. fur. rd. yd. ft. in. | 97) 1725(17s.) |
| 250 | 38) 662 4 28 3 2 2(17m.) | 97 |
| 42 | 38 | 755 |
| 62) | 282 | 679 |
| 670(10oz.) | 266 | 76 |
| 62 | 16 | 12 |
| 50 | 8 | 97) 921(9d.) |
| 16 | 38) 132(3fur.) | 873 |
| 306 | 114 | 48 |
| 50 | 18 | 4 |
| 62) 806(13dr.) | 40 | 97) 194(2qr.) |
| 62 | 38) 748(19rd.) | 194 |
| 186 | 38 | |
| 186 | 368 | |
| bu. pk. qt. pt. | 342 | |
| 98) 2739 1 5 0(27bu.) | 26 | |
| 196 | 5 $\frac{1}{2}$ | |
| 779 | 133 | 347) 2732 |
| 686 | 13 | 2 2(7yd.) |
| 93 | 38) 146(3yd.) | 2429 |
| 4 | 114 | 303 |
| 98) 373(3pk.) | 32 | 4 |
| 294 | 3 | 347) 1214(3qr.) |
| 79 | 38) 98(2ft.) | 1041 |
| 8 | 76 | 173 |
| 98) 637(6qt.) | 22 | 4 |
| 588 | 12 | 347) 694(2na.) |
| 49 | 38) 266(7in.) | 694 |
| 2 | 266 | |
| 98) 98(1pt.) | | |
| 98 | | |

| | (7.) | (8.) |
|------------------------------|----------------------|------------------------|
| | A. R. p. yd. ft. in. | T. cwt. qr. lb. oz. |
| 19) 262 | 3 37 25 1 40(13A. | 451) 8003 8 1 0 10(17' |
| 19 | | 451 |
| | 72 | 3493 |
| | 57 | 3157 |
| | 15 | 336 |
| | 4 | 20 |
| 19) 63(3R. | | 451) 6728(14cwt. |
| 57 | | 451 |
| | 6 | 2218 |
| | 40 | 1804 |
| 19) 277(14p. | | 414 |
| 19 | | 4 |
| | 87 | 451) 1657(3qr. |
| | 76 | 1353 |
| | 11 | 304 |
| | 30 $\frac{1}{4}$ | 28 |
| | 355 | 451) 8512(18lb. |
| | 2 $\frac{1}{4}$ | 451 |
| 19) 357 $\frac{1}{4}$ (18yd. | | 4002 |
| 19 | | 3608 |
| | 167 | 394 |
| | 152 | 16 |
| | 15 $\frac{1}{4}$ | 451) 6314(14oz. |
| | 9 | 451 |
| 19) 142 $\frac{3}{4}$ (7ft. | | 1804 |
| 133 | | 1804 |
| | 9 $\frac{3}{4}$ | |
| | 144 | |
| | 36 | (Brought up.) |
| | 36 | 19) 1444(76in. |
| | 940 | 133 |
| | 108 | |
| | 1444 | 114 |
| (Carried up.) | | |

MISCELLANEOUS EXAMPLES IN MULTIPLICATION
AND DIVISION OF COMPOUND NUMBERS.

(ART. 111, p. 129.)

(1.)

| cwt. | qr. | lb. | | £ | s. | d. |
|------|-----|-----|--|-----|----|------|
| 8 | 3 | 20 | | 1 | 17 | 6 |
| | | 5 | | | | 10 |
| 44 | 2 | 16 | | 18 | 15 | 0 |
| | | 6 | | | | 10 |
| 267 | 3 | 12 | | 187 | 10 | 0 |
| 67 | 3 | 12 | | | | 2 |
| 200 | 0 | 0 | | 375 | 0 | 0 |
| | | | | | | Ans. |

(2.)

| A. | R. | p. | | £ | s. | d. |
|----------|----|----|----|----|----|--------|
| 12)11067 | 1 | 8 | | 0 | 1 | 9½ × 7 |
| 12)922 | 1 | 4 | | | | 10 |
| | 76 | 3 | 17 | 0 | 17 | 11 × 9 |
| | 4 | | | | | 10 |
| 307R. | | | | 8 | 19 | 2 × 2 |
| 40 | | | | | | 10 |
| 12297p. | | | | 89 | 11 | 8 × 2 |
| | | | | | | 10 |

(3.)

| m. | fur. | rd. | | m. | fur. | rd. | | £ | s. | d. |
|------|------|-----|--|------|------|-----|------|-----|----|-------------------------|
| 18 | 7 | 32 | | 2644 | 3 | 12 | | 895 | 16 | 8 = 10000 |
| | 10 | | | 1897 | 4 | 0 | | 179 | 3 | 4 = 2000 |
| 189 | 6 | 0 | | 746 | 7 | 12 | Ans. | 17 | 18 | 4 = 200 |
| | 10 | | | | | | | 8 | 1 | 3 = 90 |
| 1897 | 4 | 0 | | | | | | 12 | 6½ | = 7 |
| | | | | | | | | | | Ans. 1101 12 1½ = 12297 |

(4.)

| | |
|------|-----------------------|
| y. | d. |
| 1807 | 365 |
| 1798 | 9 |
| 9y. | 3285d. |
| | 1 add for leap year. |
| | 67 " from July 4 to |
| | 3353 days. [Sept. 9.] |

h. m.
11 19 P. M.
3 17 A. M.
20 2

Ans. 3353d. 20h. 2m.

KEY TO

(5.)

$$3124\text{rd.} \times 8 = 24992\text{rd.} = 78\text{m. } 0\text{fur. } 32\text{rd.}$$

| | | | |
|------|---|--|--|
| | $\begin{array}{r} \text{m.} \\ 121 \\ 78 \end{array}$ | $\begin{array}{r} \text{fur.} \\ 5 \\ 0 \end{array}$ | $\begin{array}{r} \text{rd.} \\ 0 \\ 32 \end{array}$ |
| Ans. | $\begin{array}{r} 43 \\ 4 \\ 8 \end{array}$ | | |

(6.)

| | | |
|--|--|---|
| $\begin{array}{r} \text{cwt.} \\ 7 \\ 126 \\ 71 \end{array}$ | $\begin{array}{r} \text{qr.} \\ 3 \\ 2 \\ 0 \end{array}$ | $\begin{array}{r} \text{lb.} \\ 18 \\ 16 \\ 22 \end{array}$ |
| <hr/> | | |
| $126 \quad 2 \quad 8 = 14176\text{lb.}$ | | |
| $71 \quad 0 \quad 22$ | | |
| $55 \quad 1 \quad 14 = 6202\text{lb.}$ | | |

| | | |
|---|---|--|
| $\begin{array}{r} \text{cwt.} \\ 7 \\ 71 \end{array}$ | $\begin{array}{r} \text{qr.} \\ 3 \\ 0 \end{array}$ | $\begin{array}{r} \text{lb.} \\ 18 \\ 9 \end{array}$ |
| <hr/> | | |
| $71 \quad 0 \quad 22 = 7974\text{lb.}$ | | |

$$\begin{aligned} 7974 \times 6 &= \$ 478.44 \\ 6202 \times 7 &= \frac{434.14}{\$ 912.58} \\ 14176 \times 5 &= \frac{708.80}{\text{Ans. } \$ 203.78} \end{aligned}$$

$$\begin{array}{r} (7.) \\ \begin{array}{r} \text{f.} \\ 17 \\ 30 \\ 10 \\ 17 \end{array} \end{array} \quad \begin{array}{r} \text{f.} \\ 1 \\ 17 \\ 6 \\ 144 \end{array}$$

$$\begin{array}{r} \text{f.} \\ 17 \\ 0 \\ 2 \\ 170 \\ 270 \\ 0 \\ 0 \end{array} \quad \text{Ans.}$$

$$\begin{array}{r} (8.) \\ \begin{array}{r} \text{m.} \\ 17 \\ 4 \\ 30 \\ 10 \end{array} \end{array} \quad \begin{array}{r} \text{m.} \\ 12 \\ 3 \\ 20 \\ 10 \end{array}$$

$$\begin{array}{r} \text{m.} \\ 175 \\ 7 \\ 20 \\ 124 \\ 3 \\ 0 \end{array} \quad \begin{array}{r} \text{m.} \\ 124 \\ 3 \\ 0 \end{array}$$

$$\begin{array}{r} 51 \\ 4 \\ 20 \\ 50 \end{array}$$

$$1 \quad 4 \quad 20 \quad \text{Ans.}$$

$$\begin{aligned} (9.) \quad \$ 5.75 \times 760 &= \$ 4370 ; \\ \$ 4370 \div .02 &= 218500\text{lb.} ; \\ 218500\text{lb.} \div 2 &= 109250\text{lb.} ; \\ 109250\text{lb.} &= 48\text{T. } 15\text{cwt. } 1\text{lqr. } 22\text{lb. Ans.} \end{aligned}$$

$$\begin{array}{r} (10.) \\ \begin{array}{r} \text{A.} \\ 0 \\ 44 \\ 200 \\ 17 \end{array} \end{array} \quad \begin{array}{r} \text{A.} \\ 2 \\ 0 \\ 39 \\ 165\frac{1}{4} \end{array} \quad \begin{array}{r} \text{R.} \\ 0 \\ 39 \\ 165\frac{1}{4} \end{array} \quad \begin{array}{r} \text{P.} \\ 133 \\ 240 \\ 165\frac{1}{4} \end{array} \quad \begin{array}{r} \text{ft.} \\ 97903 \end{array}$$

$$\begin{array}{r} 4 \\ 3 \\ 2 \\ 2 \end{array} \quad \begin{array}{r} 0 \\ 0 \\ 0 \\ 39 \end{array} \quad \begin{array}{r} 133 \\ 240 \\ 165\frac{1}{4} \end{array}$$

1s. $2\frac{1}{2}\text{d.} \times 97903 = 5914\text{f. } 19\text{s. } 5\frac{1}{2}\text{d. Ans.}$

(11.)

$$100 \times 100 = 10000 \text{ sq. rd.} \quad 3563 \times \$1.75 = \$6235.25 \text{ Ans.}$$

5A. 3R. 17p. = 937

$$\begin{array}{r} 50 \times 50 = 2500 \\ \hline 3000 \\ \hline 6437 \\ \hline 3563 \text{ sq. rd.} \end{array}$$

CANCELLATION.

(ART. 115, p. 132.)

$$3. \frac{27 \times 16}{27} = 16.$$

$$4. \frac{42 \times 19}{19} = 42.$$

$$5. \frac{8 \times 6 \times 3}{6 \times 3 \times 4} = 2.$$

$$6. \frac{17 \times 6 \times 2}{6 \times 2 \times 17} = 1.$$

$$7. \frac{15 \times 30 \times 10}{10 \times 15} = 30.$$

(ART. 116, p. 133.)

$$10. \frac{3^2 \times 2^2 \times 9 \times 8 \times 2 \times 14}{3 \times 4 \times 6 \times 7} = 4.$$

$$11. \frac{2^2 \times 5 \times 10 \times 18}{8 \times 6 \times 2 \times 12} = \frac{2^5}{2} [= 12\frac{1}{2}]$$

$$12. \frac{2^2 \times 9 \times 12 \times 5}{3 \times 11 \times 6 \times 4} = 15.$$

$$13. \frac{5^2 \times 7 \times 14 \times 36}{4 \times 10 \times 21 \times 54} = \frac{11}{2} \frac{3}{3} \frac{6}{6} [= 1\frac{1}{6}]$$

$$14. \frac{2^2 \times 3^3 \times 9 \times 2 \times 26 \times 72 \times 81 \times 12}{36 \times 18 \times 24 \times 54} = 3.$$

(ART. 117, p. 134.)

$$16. \frac{2^2 \times 4 \times 9 \times 2 \times 12 \times 16 \times 5}{4 \times 6 \times 6 \times 3 \times 8 \times 4 \times 20} = 2.$$

$$17. \frac{8 \times 15 \times 16 \times 24 \times 12 \times 21 \times 27}{2 \times 10 \times 9 \times 8 \times 36 \times 7 \times 81} = 8.$$

PROPERTIES AND RELATIONS OF NUMBERS.

| | | | |
|------------------------|--------|----|---|
| 2. (ART. 122, p. 136.) | 3 | 5. | 7 |
| 3. | 2 or 4 | 6. | 4 |
| 4. | 4 | | |

| | | | |
|------------------------|----|-----|----|
| 2. (ART. 124, p. 137.) | 5 | 7. | 4 |
| 3. | 24 | 8. | 12 |
| 4. | 1 | 9. | 2 |
| 5. | 2 | 10. | 6 |
| 6. | 6 | | |

| | | (ART. 128, p. 139.) | | |
|----|--|---------------------|--|--------|
| 2. | $2) \underline{8 \ 4 \ 8 \ 6}$ | 6. | $6) \underline{9 \ 8 \ 12 \ 18 \ 24}$ | |
| | $\underline{4} \quad \quad \quad 3$ | | $\quad \quad \quad 3 \quad 4$ | |
| | $2 \times 4 \times 3 = 24$ Ans. | | $6 \times 3 \times 4 = 72$ Ans. | |
| 3. | $7) \underline{14 \ 21 \ 15}$ | 7. | $2) \underline{10 \ 12 \ 16 \ 18 \ 20}$ | |
| | $\underline{2} \quad \quad \quad 3 \quad 15$ | | $2) \underline{6 \ 8 \ 9 \ 10}$ | |
| | $7 \times 2 \times 15 = 210$ Ans. | | $3) \underline{3 \ 4 \ 9 \ 5}$ | |
| 4. | $2) \underline{8 \ 4 \ 5 \ 6 \ 7 \ 8}$ | | $\quad \quad \quad 1 \quad 4 \quad 3 \quad 5$ | |
| | $\quad \quad \quad 5 \quad 3 \quad 7 \quad 4$ | | $2 \times 2 \times 3 \times 4 \times 3 \times 5 = 720$ | |
| | $2 \times 5 \times 3 \times 7 \times 4 = 840$ Ans. | | | [Ans.] |
| 5. | $4) \underline{16 \ 12 \ 16 \ 20 \ 24}$ | | | |
| | $\quad \quad \quad 2) \underline{4 \ 5 \ 6}$ | | | |
| | $\quad \quad \quad 2 \quad 5 \quad 3$ | | | |
| | $4 \times 2 \times 2 \times 5 \times 3 = 240$ Ans. | | | |

VULGAR FRACTIONS.

| | | | |
|------------------------|---------------|-----|-----------------|
| 2. (ART. 135, p. 142.) | $\frac{1}{2}$ | 7. | $\frac{12}{36}$ |
| 3. | $\frac{2}{3}$ | 8. | $\frac{1}{4}$ |
| 4. | $\frac{1}{2}$ | 9. | $\frac{7}{21}$ |
| 5. | $\frac{2}{3}$ | 10. | $\frac{17}{51}$ |
| 6. | $\frac{1}{2}$ | | |

| | | | |
|------------------------|--------------------|-----|-------------------|
| 2. (Art. 136, p. 143.) | $\frac{4}{7}$ | 10. | $\frac{182}{133}$ |
| 3. | $\frac{13}{4}$ | 11. | $\frac{133}{111}$ |
| 4. | $\frac{103}{11}$ | 12. | $\frac{134}{11}$ |
| 5. | $\frac{44}{11}$ | 13. | $\frac{140}{16}$ |
| 6. | $\frac{157}{12}$ | 14. | $\frac{875}{60}$ |
| 7. | $\frac{169}{8}$ | 15. | $\frac{243}{16}$ |
| 8. | $\frac{1884}{11}$ | 16. | $\frac{1760}{15}$ |
| 9. | $\frac{5442}{117}$ | | |
| 2. (Art. 137, p. 144.) | 12 | 7. | 1 |
| 3. | $10\frac{8}{17}$ | 8. | 567 |
| 4. | $10\frac{11}{11}$ | 9. | $9\frac{2}{3}$ |
| 5. | $18\frac{4}{6}$ | 10. | $4\frac{4}{13}$ |
| | 1428 | | |

(Art. 138, p. 145.)

| | | |
|----|---|--|
| 3. | $\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{48}{105}$ Ans. | $\frac{2}{7}$ |
| 4. | $\frac{7}{8} \times \frac{9}{11} \times \frac{7}{1} = \frac{49}{88} = 5\frac{1}{88}$ [Ans.] | $\frac{9}{7} \times \frac{4}{11} \times \frac{7}{9} \times \frac{9}{10} \times \frac{13}{3} =$ $5 [\frac{26}{55}$ Ans.] |
| 5. | $\frac{7}{8} \times \frac{9}{11} \times \frac{3}{8} \times \frac{4}{7} = \frac{27}{176}$ Ans. | $\frac{15}{16} \times \frac{8}{9} \times \frac{7}{11} = \frac{35}{132}$ Ans. |
| 6. | $\frac{11}{17} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{20} \times \frac{7}{1} = \frac{231}{2720}$ [Ans.] | $\frac{8}{11} \times \frac{22}{35} \times \frac{15}{22} \times \frac{77}{8} = 3$ [Ans.] |
| 7. | $\frac{3}{5} \times \frac{4}{11} \times \frac{11}{17} \times \frac{17}{23} \times \frac{23}{4} = \frac{3}{5}$ [Ans.] | $\frac{5}{7} \times \frac{3}{15} \times \frac{4}{16} \times \frac{35}{4} \times \frac{11}{5} =$ $[\frac{11}{16}$ Ans.] |
| 8. | $\frac{1}{5} \times \frac{8}{9} \times \frac{9}{11} \times \frac{5}{8} \times \frac{3}{7} = \frac{5}{7}$ [Ans.] | |

(Art. 140, p. 147.)

| | |
|--|--|
| 2. $3 \times 6 = 18 = \frac{18}{12} = \frac{9}{6}$ | $7 \times 5 \times 2 = 70 = \frac{70}{10}$ |
| $5 \times 4 = 20 = \frac{20}{12} = \frac{10}{6}$ | $4 \times 9 \times 2 = 72 = \frac{72}{12}$ |
| $4 \times 6 = 24$ | $1 \times 9 \times 5 = 45 = \frac{45}{9}$ |

$$\underline{9 \times 5 \times 2 = 90}$$

| | |
|--|---|
| 4. $4 \times 8 \times 11 = 352 = \frac{352}{4} = 88$ $3 \times 7 \times 11 = 231 = \frac{231}{3} = 77$ $5 \times 7 \times 8 = 280 = \frac{280}{5} = 56$ <hr/> $7 \times 8 \times 11 = 616$ | 6. $1 \times 5 \times 8 \times 4 = 160 = \frac{160}{1} = 160$ $2 \times 6 \times 8 \times 4 = 384 = \frac{384}{2} = 192$ $7 \times 6 \times 5 \times 4 = 840 = \frac{840}{7} = 120$ $1 \times 6 \times 5 \times 8 = 240 = \frac{240}{1} = 240$ <hr/> $6 \times 5 \times 8 \times 4 = 960$ |
| 5. $8 \times 12 \times 3 = 288 = \frac{288}{8} = 36$ $5 \times 9 \times 3 = 135 = \frac{135}{5} = 27$ $2 \times 9 \times 12 = 216 = \frac{216}{2} = 108$ <hr/> $9 \times 12 \times 3 = 324$ | |

(ART. 141, p. 150.)

(2.)

$$\begin{array}{r}
 \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{7}{8} \\
 2) \underline{4 \quad 5 \quad 6 \quad 8} \\
 2 \quad 5 \quad 3 \quad 4 \\
 \hline
 1 \quad 5 \quad 3 \quad 2 \\
 2 \times 2 \times 5 \times 3 \times 2 = 120 \\
 \hline
 \begin{array}{r}
 120 \\
 4 \left| \begin{array}{r} 30 \times 3 = 90 \\ 5 \quad 24 \times 4 = 96 \\ 6 \quad 20 \times 5 = 100 \\ 8 \quad 15 \times 7 = 105 \end{array} \right. \\
 \hline
 \frac{90}{120}, \frac{96}{120}, \frac{100}{120}, \frac{105}{120} \text{ Ans.}
 \end{array}
 \end{array}$$

(3.)

$$\begin{array}{r}
 \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10} \\
 4 \times 5 \times 9 \times 11 = 1980 \\
 \hline
 \begin{array}{r}
 1980 \\
 4 \quad 495 \times 3 = 1485 \\
 5 \quad 396 \times 2 = 792 \\
 9 \quad 220 \times 4 = 880 \\
 11 \quad 180 \times 2 = 360
 \end{array}
 \end{array}$$

$\frac{1485}{1980}, \frac{792}{1980}, \frac{880}{1980}, \frac{360}{1980}$ Ans.

(5.)

$$\begin{array}{r}
 \frac{3}{7}, \frac{9}{10}, \frac{11}{12}, \frac{3}{4} \\
 4) \underline{8 \quad 10 \quad 4} \\
 2) \underline{2 \quad 10 \quad 1} \\
 \hline
 1 \quad 5 \quad 1 \\
 4 \times 2 \times 5 = 40 \\
 \hline
 \begin{array}{r}
 40 \\
 8 \left| \begin{array}{r} 5 \times 7 = 35 \\ 4 \times 9 = 36 \\ 4 \quad 10 \times 31 = 310 \end{array} \right. \\
 \hline
 \frac{35}{40}, \frac{36}{40}, \frac{310}{40} \text{ Ans.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \frac{3}{7}, \frac{9}{14}, \frac{11}{28}, \frac{3}{7} \\
 7) \underline{7 \quad 14 \quad 28 \quad 7} \\
 2) \underline{1 \quad 2 \quad 4 \quad 1} \\
 \hline
 1 \quad 1 \quad 2 \quad 1 \\
 7 \times 2 \times 2 = 28 \\
 \hline
 \begin{array}{r}
 28 \\
 7 \quad 4 \times 3 = 12 \\
 14 \quad 2 \times 9 = 18 \\
 28 \quad 1 \times 11 = 11 \\
 7 \quad 4 \times 38 = 152 \\
 \hline
 \frac{12}{28}, \frac{18}{28}, \frac{11}{28}, \frac{152}{28} \text{ Ans.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 \frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10} \\
 2) 2 \quad 4 \quad 6 \quad 8 \quad 8 \quad 12 \\
 \hline
 3) 1 \quad 2 \quad 3 \quad 4 \quad 4 \quad 6 \\
 2) 1 \quad 2 \quad 1 \quad 4 \quad 4 \quad 2 \\
 \hline
 2) 1 \quad 1 \quad 1 \quad 2 \quad 2 \quad 1 \\
 \hline
 \end{array}$$

$$1 \quad 1 \quad 1$$

$$2 \times 3 \times 2 \times 2 = 24$$

$$\begin{array}{c|c}
 24 & \\
 \hline
 2 | 12 \times 1 = 12 \\
 4 | 6 \times 3 = 18 \\
 6 | 4 \times 5 = 20 \\
 8 | 3 \times 5 = 15 \\
 8 | 3 \times 7 = 21 \\
 12 | 2 \times 5 = 10
 \end{array}$$

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}, \frac{21}{20} \text{ Ans.}$$

$$\begin{array}{r}
 (7.) \\
 \frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10} \\
 3) 9 \quad 3 \quad 3 \quad 4 \quad 6 \quad 12 \\
 \hline
 2) 3 \quad 1 \quad 1 \quad 4 \quad 2 \quad 4 \\
 \hline
 2) 3 \quad 1 \quad 1 \quad 2 \quad 1 \quad 2 \\
 \hline
 3 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1
 \end{array}$$

$$3 \times 2 \times 2 \times 3 = 36$$

$$\begin{array}{c|c}
 36 & \\
 \hline
 9 | 4 \times 4 = 16 \\
 3 | 12 \times 2 = 24 \\
 3 | 12 \times 1 = 12 \\
 4 | 9 \times 1 = 9 \\
 6 | 6 \times 1 = 6 \\
 12 | 3 \times 1 = 3
 \end{array}$$

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}, \frac{9}{10}, \frac{21}{20} \text{ Ans.}$$

$$\begin{array}{r}
 (8.) \\
 \frac{1}{2}, \frac{3}{4}, \frac{5}{6} \\
 3) 6 \quad 9 \quad 12 \\
 \hline
 2) 2 \quad 3 \quad 4
 \end{array}$$

$$1 \quad 3 \quad 2$$

$$3 \times 2 \times 3 \times 2 = 36$$

$$\begin{array}{c|c}
 36 & \\
 \hline
 6 | 6 \times 5 = 30 \\
 9 | 4 \times 4 = 16 \\
 12 | 3 \times 7 = 21
 \end{array}$$

$$\frac{1}{2}, \frac{3}{4}, \frac{5}{6} \text{ Ans.}$$

$$\begin{array}{r}
 (9.) \\
 7\frac{1}{2}, 5\frac{6}{11}, 7, 8 = \frac{21}{4}, \frac{60}{11}, \frac{7}{1}, \frac{8}{1}
 \end{array}$$

$$4 \times 11 = 44$$

$$\begin{array}{c|c}
 44 & \\
 \hline
 4 | 11 \times 31 = 341 \\
 11 | 4 \times 61 = 244 \\
 1 | 44 \times 7 = 308 \\
 1 | 44 \times 8 = 352
 \end{array}$$

$$\frac{21}{4}, \frac{60}{11}, \frac{7}{1}, \frac{8}{1} \text{ Ans.}$$

$$\begin{array}{r}
 (10.) \\
 \frac{1}{2}, 4, 5, 7, 9 = \frac{3}{4}, \frac{1}{4}, \frac{5}{4}, \frac{7}{4}, \frac{9}{4}
 \end{array}$$

$$\begin{array}{c|c}
 4 & \\
 \hline
 1 | 1 \times 3 = 3 \\
 1 | 4 \times 4 = 16 \\
 1 | 4 \times 5 = 20 \\
 1 | 4 \times 7 = 28 \\
 1 | 4 \times 9 = 36
 \end{array}$$

$$\frac{1}{2}, \frac{1}{4}, \frac{5}{4}, \frac{7}{4}, \frac{9}{4} \text{ Ans.}$$

| | | | |
|----|---------------------|---|--------------------------------------|
| 2. | (ART. 143, p. 149.) | $3\frac{1}{2} \times 5 = 15\frac{1}{2}$ | $2\frac{1}{2}$ |
| 3. | | $2\frac{1}{2} \times 6 = 15\frac{1}{2}$ | $1\frac{1}{2}\frac{1}{2}$ |
| 4. | | $2\frac{1}{2} \times 7 = 17\frac{1}{2}$ | $1\frac{1}{2}\frac{1}{2}\frac{1}{2}$ |

(ART. 144, p. 149.)

$$\begin{array}{r} (2.) \\ 4) 8 \quad 12 \quad 16 \\ 2) 2 \quad 3 \quad 4 \\ \hline 1 \quad 3 \quad 2 \end{array} \qquad \begin{array}{r} (3.) \\ 2) 20 \quad 18 \quad 14 \\ 10 \quad 9 \quad 7 \\ \hline 2 \times 10 \times 9 \times 7 = 1260 \end{array}$$

$$\begin{array}{r} 4 \times 2 \times 3 \times 2 = 48 \\ | \\ 48 \\ 8 \quad 6 \times 5 = 30 \\ 12 \quad 4 \times 11 = 44 \\ 16 \quad 3 \times 13 = 39 \end{array}$$

$$\frac{113}{48} = 2\frac{1}{4} \text{ Ans.}$$

$$(4.) \qquad 21 \times 37 = 777$$

$$\begin{array}{r} 777 \\ | \\ 21 \quad 37 \times 19 = 703 \\ 37 \quad 21 \times 31 = 651 \\ \hline 1354 \\ 777 = 1\frac{1}{2} \text{ Ans.} \end{array}$$

$$\begin{array}{r} 1260 \\ | \\ 63 \times 9 = 567 \\ 70 \times 11 = 770 \\ 90 \times 5 = 450 \\ \hline 1787 \\ 1260 = 1\frac{127}{1260}, \quad [\text{Ans.}] \end{array}$$

$$\begin{array}{r} (5.) \\ 4) 4 \quad 6 \quad 8 \quad 12 \\ 3) 1 \quad 6 \quad 2 \quad 3 \\ 2) 1 \quad 2 \quad 2 \quad 1 \\ \hline 1 \quad 1 \quad 1 \quad 1 \end{array}$$

$$4 \times 2 \times 3 = 24$$

$$\begin{array}{r} 24 \\ | \\ 6 \times 3 = 18 \\ 4 \times 5 = 20 \\ 8 \times 3 = 9 \\ 12 \times 1 = 2 \\ \hline 49 \\ 24 = 2\frac{1}{2} \text{ Ans.} \end{array}$$

(6.)

$$\begin{array}{r} 3) 9 \quad 21 \quad 24 \quad 2 \\ 2) 3 \quad 7 \quad 8 \quad 2 \\ \hline 3 \quad 7 \quad 4 \quad 1 \end{array}$$

$$3 \times 2 \times 3 \times 7 \times 4 = 504$$

$$\begin{array}{r} 504 \\ | \\ 56 \times 4 = 224 \\ 24 \times 8 = 192 \\ 21 \times 11 = 231 \\ 252 \times 1 = 252 \\ \hline 899 \\ 504 = 1\frac{395}{504}, \quad [\text{Ans.}] \end{array}$$

$$(7.) \quad \begin{array}{r} 12) 72 \ 84 \ 96 \\ 2) 6 \ 7 \ 8 \\ \hline 3 \ 7 \ 4 \end{array}$$

$$12 \times 2 \times 3 \times 7 \times 4 = 2016$$

$$\begin{array}{r} 2016 \\ 72 \left| \begin{array}{r} 28 \times 19 = 532 \\ 84 \quad 24 \times 51 = 1224 \\ 96 \quad 21 \times 71 = 1491 \\ \hline 3247 \end{array} \right. \\ \hline 2016 = 1\frac{1231}{16}, \quad [\text{Ans.}] \end{array}$$

$$(8.) \quad \begin{array}{r} 25) 25 \ 50 \ 75 \ 100 \\ 2) 1 \ 2 \ 3 \ 4 \\ \hline 1 \ 1 \ 3 \ 2 \end{array}$$

$$25 \times 2 \times 3 \times 2 = 300$$

$$\begin{array}{r} 300 \\ 25 \left| \begin{array}{r} 12 \times 3 = 36 \\ 50 \quad 6 \times 49 = 294 \\ 75 \quad 4 \times 74 = 296 \\ \hline 3 \times 81 = 243 \end{array} \right. \\ \hline 300 = 2\frac{869}{300}, \quad [\text{Ans.}] \end{array}$$

$$(9.) \quad \begin{array}{r} 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \\ 2) 1 \ 3 \ 2 \ 5 \ 3 \ 7 \ 4 \\ \hline 3) 1 \ 3 \ 1 \ 5 \ 3 \ 7 \ 2 \\ \hline 1 \ 1 \ 1 \ 5 \ 1 \ 7 \ 2 \end{array}$$

$$2 \times 2 \times 3 \times 5 \times 7 \times 2 = 840$$

$$\begin{array}{r} 840 \\ 2 \quad 420 \times 1 = 420 \\ 3 \quad 280 \times 2 = 560 \\ 4 \quad 210 \times 3 = 630 \\ 5 \quad 168 \times 4 = 672 \\ 6 \quad 140 \times 5 = 700 \\ 7 \quad 120 \times 6 = 720 \\ 8 \quad 105 \times 7 = 735 \end{array}$$

$$\frac{4437}{840} = 5\frac{79}{840} \text{ Ans.}$$

$$(10.) \quad \begin{array}{r} 9 \ 10 \ 11 \ 12 \ 13 \ 14 \ 15 \\ 2) 3 \ 10 \ 11 \ 4 \ 13 \ 14 \ 5 \\ \hline 5) 3 \ 5 \ 11 \ 2 \ 13 \ 7 \ 5 \\ \hline 3 \ 1 \ 11 \ 2 \ 13 \ 7 \ 1 \end{array}$$

$$3 \times 2 \times 5 \times 3 \times 11 \times 2 \times 13 \times 7 \\ [= 180180]$$

$$\begin{array}{r} 180180 \\ 9 \quad 20020 \times 8 = 160160 \\ 10 \quad 18018 \times 9 = 162162 \\ 11 \quad 16380 \times 10 = 163800 \\ 12 \quad 15015 \times 11 = 165165 \\ 13 \quad 13860 \times 12 = 166320 \\ 14 \quad 12870 \times 13 = 167310 \\ 15 \quad 12012 \times 14 = 168168 \end{array}$$

$$\frac{1158085}{180180} = 6\frac{1449}{180180} \text{ Ans.}$$

(11.)

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$$

$$\frac{5}{6} \times \frac{7}{8} = \frac{35}{48}$$

$$2) 2 \quad 48$$

$$\begin{array}{r} 1 \quad 24 \end{array}$$

$$2 \times 24 = 48$$

$$\begin{array}{r} 48 \\ 2 \left| \begin{array}{r} 24 \times 1 = 24 \\ 1 \times 35 = 35 \end{array} \right. \\ \hline \end{array}$$

$$\frac{59}{48} = 1\frac{11}{48} \text{ Ans.}$$

(12.)

$$\begin{array}{r} 8) 32 \quad 24 \\ \hline 4 \quad 3 \end{array}$$

$$\begin{array}{r}
 8 \times 4 \times 3 = 96 \\
 \hline
 \begin{array}{r}
 96 \\
 3 \times 21 = 63 \\
 4 \times 11 = 44 \\
 \hline
 107 \\
 -96 \\
 \hline
 11
 \end{array}
 \end{array}
 \text{Ans. } 11$$

$$\begin{aligned} & \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{2}{5} \\ & \frac{5}{6} \times \frac{6}{7} \times \frac{7}{10} = \frac{5}{10} = \frac{1}{2} \\ & 2 \times 5 = 10 \\ & \begin{array}{r} 10 \\ 2 \times 2 = 4 \\ \hline 5 \times 1 = 5 \\ \hline 9 \\ \hline 10 \end{array} \text{ Ans.} \end{aligned}$$

$$\begin{array}{r}
 7) \overline{14} \\
 1 \quad 2 \\
 7 \times 2 = 14
 \end{array}$$

$$\begin{array}{r}
 14 \\
 \hline
 7) \overline{2 \times 24 = 48} \\
 1 \times 67 = 67 \\
 \hline
 115 \\
 \hline
 14 = 8\frac{3}{14} \text{ Ans.}
 \end{array}$$

$$(13.) \quad \frac{1}{9} \times \frac{2}{3} = \frac{2}{27}; \quad \frac{1}{6} \times \frac{7}{10} = \frac{7}{60}$$

$$27 \times 50 = 1350$$

$$\begin{array}{r}
 \text{1350} \\
 \hline
 27 \left| \begin{array}{r} 50 \times 2 = 100 \\ 27 \times 7 = 189 \end{array} \right. \\
 \hline
 \begin{array}{r} 289 \\ \hline 1350 \end{array} \quad \text{Ans.}
 \end{array}$$

$$\times \frac{3}{11} \times \frac{11}{12} = \frac{1}{12}$$

$$\begin{array}{r}
 3) \overline{12} \quad 9 \\
 \quad\quad\quad 4 \quad 3 \\
 3 \times 4 \times 3 = 36 \\
 \hline
 12 \quad | \quad 36 \\
 9 \quad | \quad 3 \times 1 = 3 \\
 \quad\quad\quad 4 \times 1 = 4
 \end{array}$$

$$\frac{7}{36} \text{ Ans.}$$

$$\frac{43}{4} = \frac{19}{4}; \quad \frac{56}{7} = \frac{41}{7}$$

$$4 \times 7 = 28$$

$$4 \times 7 = 28$$

$$4 \times 7 = 28$$

$$\begin{array}{r}
 28 \\
 \hline
 4 \quad 7 \times 19 = 133 \\
 7 \quad 4 \times 41 = 164 \\
 \hline
 297 \\
 \hline
 28 = 10\frac{7}{28} \text{ Ans.}
 \end{array}$$

$$17\frac{3}{4} = \frac{71}{4} \quad 18\frac{5}{12} = \frac{221}{12} \quad (18.)$$

$$\begin{array}{r} 4) 4 \quad 12 \\ \hline 1 \quad 3 \\ 4 \times 3 = 12 \end{array} \quad \begin{array}{r} 12 \\ \hline 4 \quad | \quad 3 \times 71 = 213 \\ 12 \mid 1 \times 221 = 221 \\ \hline 434 \\ 12 \end{array} = 36\frac{1}{4} \text{ Ans.}$$

2. (Art. 147, p. 151.) 4. 6. 8. 10.
3. 5. 7. 9.

SUBTRACTION OF VULGAR FRACTIONS.

| | | |
|--|--|--|
| (2.) | (ART. 148, p. 152.) | (5.) |
| $\frac{7}{18} - \frac{4}{21}$ $3 \times 6 \times 7 = 126$ | $3) \frac{18 \quad 21}{\quad 6 \quad 7}$ $2 \times 17 \times 5 = 170$ | $\frac{11}{14} - \frac{1}{10}$ $2) \frac{34 \quad 10}{\quad 17 \quad 5}$ $\frac{170}{55}$ $10) \frac{5 \times 11 = 55}{17 \times 1 = 17}$ $\frac{38}{170} = \frac{19}{5}$ Ans. |
| 126 $18 \Big \begin{matrix} 7 \times 7 = 49 \\ 6 \times 4 = 24 \end{matrix}$ $\underline{\underline{25}}$ 126 Ans. | | |

| | | |
|---------------------------------|---|---|
| (3.) | $\begin{array}{r} 20 \\ \times 4 \\ \hline 80 \end{array}$ | 170 |
| $\frac{18}{20} - \frac{11}{16}$ | $\begin{array}{r} 20 & 16 \\ 4 \) & \underline{5} \\ & 4 \end{array}$ | (6.) |
| $4 \times 5 \times 4 = 80$ | $4 \times 9 \times 4 = 144$ | $\begin{array}{r} 36 & 16 \\ 4 \) & \underline{9} \\ & 4 \end{array}$ |

$$\begin{array}{r} 20 \overline{)4 \times 19 = 76} \\ 16 \quad 5 \times 11 = 55 \\ \hline 21 \\ 80 \end{array} \text{ Ans.}$$

| | |
|---|--------|
| $\begin{array}{r} \frac{17}{24} - \frac{7}{20} \\ 4) \overline{24 \quad 20} \\ 4 \times 6 \times 5 = 120 \end{array}$ $24 \left \begin{array}{r} 120 \\ 5 \times 17 = 85 \\ 6 \times 7 = 42 \end{array} \right.$ $\frac{43}{120} \text{ Ans.}$ | $(4.)$ |
| $\begin{array}{r} \frac{18}{37} - \frac{3}{11} \\ 37) \overline{407} \\ 37 \times 11 = 407 \end{array}$ $37 \left \begin{array}{r} 11 \times 18 = 198 \\ 37 \times 3 = 111 \end{array} \right.$ $\frac{87}{407} \text{ Ans.}$ | $(7.)$ |

| | |
|---|---|
| $(8.) \quad \frac{1}{9} - \frac{1}{19} \quad 200 \times 19 = 3800$ $\begin{array}{r} 3800 \\ \hline 19 \end{array}$ $200 \times \frac{19 \times 111}{19} = 2109$ $200 \times \frac{1}{1} = \frac{200}{1}$ $\begin{array}{r} 1909 \\ \hline 3800 \end{array}$ <p style="text-align: right;">Ans.</p> $(9.) \quad \frac{1}{5} - \frac{1}{1000} \quad 10) \overline{10 \ 1000}$ $10 \times 100 = 1000 \quad \begin{array}{r} 1000 \\ \hline 1 \ 100 \end{array}$ $\begin{array}{r} 1000 \\ \hline 1000 \times 1 = 100 \\ \hline 1 \times 1 = \frac{1}{1} \\ \hline 99 \\ \hline 1000 \end{array}$ <p style="text-align: right;">Ans.</p> $(10.) \quad \frac{3}{8} \times \frac{9}{11} = \frac{27}{88} = \frac{6}{11}; \quad \frac{1}{4} \times \frac{2}{5} = \frac{2}{20} = \frac{1}{10}$ $\frac{1}{11} - \frac{1}{14} \quad 11 \times 14 = 154$ $\begin{array}{r} 154 \\ \hline 14 \end{array}$ $11 \times \frac{14 \times 6}{14} = 84$ $11 \times 1 = 11$ $\begin{array}{r} 73 \\ \hline 154 \end{array}$ <p style="text-align: right;">Ans.</p> | $(11.) \quad \frac{1}{9} \times \frac{9}{10} = \frac{1}{10}; \quad \frac{1}{12} \times \frac{12}{13} = \frac{1}{13}$ $\frac{1}{10} - \frac{1}{13} \quad 10 \times 13 = 130$ $\begin{array}{r} 130 \\ \hline 13 \\ \hline 10 \\ \hline 3 \\ \hline 130 \end{array}$ <p style="text-align: right;">Ans.</p> $(12.) \quad \frac{3}{8} \times 12\frac{1}{2} = \frac{3}{8} \times \frac{25}{2} = \frac{25}{16} = \frac{25}{16};$ $\frac{3}{8} \times 9\frac{7}{12} = \frac{3}{8} \times \frac{115}{12} = \frac{23}{16} = \frac{23}{16}; \quad \frac{25}{16} - \frac{23}{16}$ $2) \overline{16 \ 6}$ $2 \times 8 \times 3 = 48 \quad \begin{array}{r} 48 \\ \hline 8 \ 3 \end{array}$ $\begin{array}{r} 48 \\ \hline 16 \end{array}$ $\frac{3}{8} \times 77 = 23\frac{1}{8}$ $6 \mid \begin{array}{r} 8 \times 23 = 184 \\ 47 \\ \hline 48 \end{array}$ <p style="text-align: right;">Ans.</p> |
|---|---|

(ART. 149, p. 152.)

7. From 23

Take $13\frac{1}{3}$ Ans. $9\frac{2}{3}$

8. 47

Ans. $\frac{1}{2}\frac{3}{8}$

9. 139

Ans. $75\frac{1}{4}\frac{1}{4}$

(ART. 150, p. 154.)

NOTE. In the following questions, the new numerator is found by multiplying each numerator by the denominator of the other fraction; and the common denominator is obtained by multiplying together the two denominators.

(12.)

$$19\frac{1}{6} = 19\frac{11}{66} \quad 15\frac{1}{4} = 15\frac{4}{8}$$

$$7\frac{3}{11} = \frac{71}{66}$$

Ans. $11\frac{5}{6}$

(13.)

$$8\frac{1}{4} = \frac{87}{32}$$

Ans. $6\frac{2}{3}$

(14.)

$$9\frac{1}{3} = 9\frac{18}{27}$$

$$3\frac{1}{9} = \frac{32}{27}$$

Ans. $5\frac{3}{27}$

(15.)

$$71\frac{1}{5} = 71\frac{12}{25}$$

$$13\frac{7}{12} = 13\frac{10}{25}$$

Ans. $57\frac{8}{25}$

| | | |
|---|--|--|
| $(16.)$ $61\frac{1}{4} = 61\frac{1+3}{4} = 61\frac{4}{4} + \frac{3}{4}$ $33\frac{3}{4} = 33\frac{3+3}{4} = 33\frac{6}{4} + \frac{3}{4}$ Ans. $27\frac{7}{4}$ | $(17.)$ $\frac{63}{12\frac{3}{4}} = \frac{63}{12\frac{3+3}{4}} = \frac{63}{12\frac{6}{4}} = \frac{63}{12\frac{3}{2}}$ Ans. $50\frac{1}{2}$ | $(18.)$ $2\frac{1}{2} = 2\frac{1+1}{2} = 2\frac{2}{2}$ $3\frac{1}{4} = 3\frac{1+3}{4} = 3\frac{4}{4}$ $1\frac{1}{2} = 1\frac{1+1}{2} = 1\frac{2}{2}$ $6\frac{1}{2} = 6\frac{1+1}{2} = 6\frac{2}{2}$ Ans. $3\frac{1}{2}$ |
|---|--|--|

| | | |
|-------------------------------|--|---|
| 2. ART. 153, p. 155.) | $\begin{array}{r l} 6\frac{3}{4} & 8 \\ 2\frac{3}{4} & 9 \\ 1\frac{7}{8} & 10 \\ 49 & 11 \\ 76\frac{1}{2} & 12 \\ 166\frac{1}{2} & 13 \end{array}$ | $352\frac{6}{11}$ $43\frac{1}{2}$ $\$ 7\frac{1}{2}$ $\$ 0.42$ $\$ 3.24$ $\$ 69\frac{1}{2}$ |
| 2. (ART. 154, p. 156.) | $\begin{array}{r l} 28 & 6 \\ 88 & 7 \\ 325 & 8 \\ 1610 & 9 \end{array}$ | $243\frac{5}{7}$ $8\frac{1}{3}$ $23\frac{3}{4}$ $6\frac{5}{13}$ |

(ART. 155, p. 157.)

| | | |
|--|---|---|
| $(3.)$ $\begin{array}{r} 9\frac{3}{8} \\ 5 \\ 45 \\ 8) 15 \\ \hline 1\frac{1}{8} \end{array}$ | $(4.)$ $\begin{array}{r} 12\frac{3}{5} \\ 7 \\ 84 \\ 5) 21 \\ \hline 4\frac{1}{5} \end{array}$ | $(5.)$ $\begin{array}{r} 8\frac{1}{2} \\ 9 \\ 72 \\ 12) 99 \\ \hline 8\frac{1}{4} \end{array}$ |
|--|---|---|

Ans. $46\frac{7}{8}$ Ans. $88\frac{1}{5}$ Ans. $80\frac{1}{4}$

| | | |
|---|---|---|
| $(6.)$ $\begin{array}{r} 7\frac{1}{2} \\ 10 \\ 70 \\ 9) 10 \\ \hline 1\frac{1}{2} \end{array}$ | $(7.)$ $\begin{array}{r} 11\frac{1}{2} \\ 8 \\ 88 \\ 7) 48 \\ \hline 6\frac{1}{2} \end{array}$ | $(8.)$ $\begin{array}{r} 7\frac{6}{11} \\ 5 \\ 35 \\ 11) 30 \\ \hline 2\frac{8}{11} \end{array}$ |
|---|---|---|

Ans. $71\frac{1}{2}$ Ans. $94\frac{1}{2}$ Ans. $\$ 37\frac{8}{11}$

| | | |
|--|---|--|
| $(9.)$ $\begin{array}{r} 23\frac{7}{12} \\ 6 \\ 138 \\ 12) 42 \\ \hline 3\frac{1}{2} \end{array}$ | $(10.)$ $\begin{array}{r} 8\frac{3}{4} \\ 5 \\ 40 \\ 8) 15 \\ \hline 1\frac{1}{2} \end{array}$ | $(11.)$ $\begin{array}{r} \$ 6\frac{3}{8} \\ 9 \\ 54 \\ 8) 27 \\ \hline 3\frac{3}{8} \end{array}$ |
|--|---|--|

Ans. $\$ 141\frac{1}{2}$ Ans. $\$ 41\frac{1}{2}$ Ans. $\$ 57\frac{3}{8}$

$$(12.) \quad \begin{array}{r} \$ 6.37\frac{1}{2} \\ - 12 \\ \hline 76.44 \end{array} \quad 2) \begin{array}{r} 12 \\ 12 \\ \hline 6 \end{array}$$

Ans. \$ 76.50

$$(13.) \quad \begin{array}{r} \$ 9\frac{3}{4} \\ - 11 \\ \hline 99 \end{array} \quad 8) \begin{array}{r} 3 \\ 33 \\ 4\frac{1}{2} \\ \hline 4\frac{1}{2} \end{array}$$

Ans. \$ 103\frac{3}{4}

$$(14.) \quad \begin{array}{r} \$ 1.75 \\ - 7.00 \\ \hline .65\frac{5}{8} \\ \hline .65\frac{5}{8} \end{array}$$

Ans. \$ 7.65\frac{5}{8}

$$(15.) \quad \begin{array}{r} \$ 11\frac{7}{8} \\ - 7 \\ \hline 77 \end{array} \quad 8) \begin{array}{r} 7 \\ 49 \\ 6\frac{1}{2} \\ \hline 6\frac{1}{2} \end{array}$$

Ans. \$ 83\frac{1}{8}

$$(16.) \quad \begin{array}{r} \$ 10\frac{5}{8} \\ - 9 \\ \hline 90 \end{array} \quad 8) \begin{array}{r} 5 \\ 45 \\ 5\frac{5}{8} \\ \hline 5\frac{5}{8} \end{array}$$

Ans. 95\frac{5}{8}

$$(17.) \quad \begin{array}{r} \$ 3\frac{1}{4} \\ - 15 \\ \hline 0\frac{5}{8} \end{array}$$

Ans. \$ 15\frac{5}{8}

$$(18.) \quad \begin{array}{r} \$ 7.62\frac{1}{2} \\ - 15 \\ \hline 114.30 \end{array} \quad 2) \begin{array}{r} 15 \\ 15 \\ \hline 7\frac{1}{2} \end{array}$$

Ans. \$ 114.37\frac{1}{2}

$$(19.) \quad \begin{array}{r} \$ 8.37\frac{1}{2} \\ - 40 \\ \hline 334.80 \end{array} \quad 2) \begin{array}{r} 40 \\ 20 \\ \hline 20 \end{array}$$

Ans. \$ 335.00

(Ans. 156, p. 158.)

2. $\frac{7}{8} \times \frac{8}{11} = \frac{7}{11}$ Ans.

7. $\frac{1}{9} \times \frac{8}{17} = \frac{8}{153}$ Ans.

3. $\frac{5}{11} \times \frac{11}{20} = \frac{1}{4}$ Ans.

8. $\frac{6}{23} \times \frac{23}{36} = \frac{1}{6}$ Ans.

4. $\frac{8}{13} \times \frac{13}{24} = \frac{1}{3}$ Ans.

9. $\frac{7}{8} \times \frac{8}{9} = \frac{7}{9}$ Ans.

5. $\frac{18}{19} \times \frac{19}{90} = \frac{1}{5}$ Ans.

10. $\frac{8}{11} \times \frac{11}{32} = \frac{1}{4}$ Ans.

6. $\frac{15}{17} \times \frac{17}{60} = \frac{1}{4}$ Ans.

11. $\frac{7}{10} \times \frac{3}{4} = \frac{21}{40}$ Ans.

$$12. \frac{2}{3} \times \frac{3}{8} = \frac{1}{4}; \frac{7}{9} \times \frac{9}{11} = \frac{7}{11}; \frac{1}{4} \times \frac{7}{11} = \frac{7}{44} \text{ Ans.}$$

$$13. \frac{3}{9} \times \frac{4}{7} \times \frac{9}{11} = \frac{12}{77}; \frac{2}{3} \times \frac{18}{1} = \frac{12}{1}; \frac{12}{77} \times \frac{12}{1} = \frac{144}{77} =$$

[1¹⁷₇ Ans.]

(ART. 157, p. 159.)

$$2. 7\frac{1}{8} \times 8\frac{3}{7} = \frac{57}{8} \times \frac{59}{7} = \frac{3463}{56} = 60\frac{3}{56} \text{ Ans.}$$

$$3. 4\frac{7}{8} \times 9\frac{1}{4} = \frac{39}{8} \times \frac{37}{4} = \frac{1443}{32} = 45\frac{3}{32} \text{ Ans.}$$

$$4. 11\frac{2}{7} \times 8\frac{4}{5} = \frac{79}{7} \times \frac{44}{5} = \frac{3476}{35} = 99\frac{1}{35} \text{ Ans.}$$

$$5. 12\frac{3}{4} \times 11\frac{5}{8} = \frac{51}{4} \times \frac{101}{8} = \frac{511}{9} = 147\frac{1}{9} \text{ Ans.}$$

$$6. 7\frac{3}{4} \times 5\frac{3}{8} = \frac{31}{4} \times \frac{43}{8} = \frac{1333}{32} = \$41\frac{3}{32} \text{ Ans.}$$

$$7. 7\frac{3}{8} \times 3\frac{1}{4} = \frac{59}{8} \times \frac{13}{4} = \frac{413}{16} = \$25\frac{13}{16} \text{ Ans.}$$

$$8. 6\frac{3}{4} \times 23\frac{3}{4} = \frac{27}{4} \times \frac{95}{4} = \frac{1275}{16} = \$152\frac{15}{16} \text{ Ans.}$$

$$9. 3\frac{1}{4} \times 9\frac{7}{8} = \frac{13}{4} \times \frac{79}{8} = \frac{2449}{32} = 34\frac{1}{32} \text{ miles, Ans.}$$

$$10. 361\frac{1}{4} \times 25\frac{3}{8} = \frac{1445}{4} \times \frac{203}{8} = \frac{2933553}{32} = \$9167\frac{113}{32} \text{ Ans.}$$

$$11. 97\frac{5}{8} \times 49\frac{3}{7} = \frac{1557}{16} \times \frac{346}{7} = \frac{269361}{112} = 4810\frac{1}{112} \text{ rd. Ans.}$$

(ART. 159, p. 161.)

$$3. \frac{6}{13} \div \frac{3}{13} = \frac{2}{13} \text{ Ans.}$$

$$8. \frac{75}{98} \div \frac{15}{98} = \frac{5}{98} \text{ Ans.}$$

$$4. \frac{18}{19} \div \frac{6}{19} = \frac{3}{19} \text{ Ans.}$$

$$9. \frac{450}{533} \div \frac{75}{533} = \frac{6}{533} \text{ Ans.}$$

$$5. \frac{7}{11} \times 12 = \frac{7}{112} \text{ Ans.}$$

$$10. \frac{7}{9} \times 12 = \frac{7}{108} \text{ Ans.}$$

$$6. \frac{11}{12} \times 8 = \frac{11}{18} \text{ Ans.}$$

$$11. \frac{5}{7} \div \frac{5}{7} = \frac{1}{1} \text{ Ans.}$$

$$7. \frac{27}{43} \div \frac{9}{43} = \frac{3}{43} \text{ Ans.}$$

3

9

$$12. \frac{3}{23} \times \frac{9}{15} = \frac{3}{115} \text{ Ans.}$$

5

3

6

$$13. \frac{3}{17} \times \frac{6}{28} = \frac{3}{28} \text{ Ans.}$$

14

2. (ART. 160, p. 161.) $18 \times 8 = 144$; $144 \div 7 = 20\frac{4}{7}$ Ans.

3. $27 \times 12 = 324$; $324 \div 11 = 29\frac{5}{11}$ Ans.

4. $23 \times 4 = 92$; $92 \div 1 = 92$ Ans.

5. $5 \times 5 = 25$; $25 \div 1 = 25$ Ans.

6. $12 \times 4 = 48$; $48 \div 3 = 16$ Ans.

7. $16 \times 2 = 32$; $32 \div 1 = 32$ Ans.

8. $100 \times 19 = 1900$; $1900 \div 17 = 111\frac{3}{17}$ Ans.

9. $50 \times 5 = 250$; $250 \div 3 = 83\frac{1}{3}$ Ans.

10. $60 \times 11 = 660$; $660 \div 9 = 73\frac{3}{4}$ minutes, Ans.

2. (ART. 161, p. 162.) $17\frac{3}{4} \div 7 = 2\frac{3}{4}$ Ans.

3. $18\frac{3}{4} \div 8 = 2\frac{7}{32}$ Ans.

4. $27\frac{1}{2} \div 9 = 3\frac{1}{18}$ Ans.

5. $31\frac{1}{10} \div 11 = 2\frac{9}{110}$ Ans.

6. $78\frac{4}{5} \div 12 = 6\frac{3}{10} = 6\frac{7}{20}$ Ans.

7. $189\frac{11}{16} \div 4 = 47\frac{13}{16}$ Ans.

8. $107\frac{1}{12} \div 3 = 35\frac{1}{12}$ Ans.

9. $\$14\frac{3}{4} \div 7 = \$2\frac{3}{4}$ Ans.

10. $106\frac{7}{8} \div 8 = \$13\frac{3}{8}$ Ans.

11. $100 \times 25 = 2500$; $2500 \div 72 = \$0.34\frac{1}{8}$ Ans.

12. $3 \times 2 = 6$; $6 + 4 = 10$; $107\frac{7}{11} \div 10 = \$10\frac{3}{10}$, boy's share; $\$10\frac{3}{10} \times 2 = \$21\frac{3}{5}$, girl's share, Ans.

13. $\frac{17}{6}$ of a ton is 17cwt.; and, if 17cwt. be divided by 14, the quotient will be 1cwt. 0qr. 24lb. Ans.

W_M

2. (ART. 162, p. 165.) $36 \times 8 = 288$; $9\frac{1}{4} \times 8 = 79$; $288 \div 79 = 3\frac{5}{7}$ Ans.

3. $97 \times 12 = 1164$; $13\frac{1}{2} \times 12 = 167$; $1164 \div 167 = 6\frac{1}{167}$ Ans.

4. $113 \times 7 = 791$; $21\frac{1}{4} \times 7 = 148$; $791 \div 148 = 5\frac{1}{148}$ Ans.

5. $342 \times 131 = 44802$; $14\frac{1}{3} \times 131 = 1881$; $44802 \div 1881 = 23\frac{5}{68}$ = $23\frac{5}{11}$ Ans.

6. $19 \times 7 = 133$; $2\frac{2}{7} \times 7 = 17$; $133 + 17 = 7\frac{2}{7}$ pieces;

$$\frac{2}{7} \times 2\frac{2}{7} = \frac{14}{7} \times \frac{17}{7} = \frac{2}{1} = 2 \text{ ft. Ans.}$$

(ART. 163, p. 164.)

2. $\frac{7}{8} \times \frac{7}{4} = \frac{49}{32} = 1\frac{17}{32}$ Ans. 6. $\frac{8}{15} \times \frac{7}{4} = \frac{56}{60} = 6\frac{4}{10}$ Ans.

3. $\frac{7}{8} \times \frac{4}{1} = \frac{7}{2} = 3\frac{1}{2}$ Ans. 7. $\frac{4}{5} \times \frac{11}{2} = \frac{44}{10} = 4\frac{4}{5}$ Ans.

4. $\frac{13}{15} \times \frac{12}{11} = \frac{156}{165} = \frac{4}{5}$ Ans. 8. $\frac{9}{13} \times \frac{26}{3} = \frac{234}{39} = 6$ Ans.

5. $\frac{5}{3} \times \frac{10}{3} = \frac{50}{9} = 2\frac{2}{9}$ Ans. 9. $\frac{19}{20} \times \frac{20}{7} = \frac{19}{7} = 2\frac{5}{7}$ Ans.

10. $\frac{2}{3} \times \frac{7}{8} \times \frac{1}{4} = \frac{7}{12}$; $\frac{1}{7} \times \frac{2}{9} = \frac{2}{63}$; $\frac{7}{12} \times \frac{63}{4} = 1\frac{1}{12}$ = [18 $\frac{3}{4}$ Ans.]

11. $\frac{4}{9} \times \frac{6}{11} \times \frac{7}{2} = \frac{7}{66}$; $\frac{2}{3} \times \frac{7}{4} \times \frac{1}{2} = \frac{7}{24}$; $\frac{7}{66} \times \frac{54}{11} = \frac{9}{11}$ [= $\frac{9}{11}$ Ans.]

12. $\frac{3}{4} \times \frac{5}{7} \times \frac{4}{3} = \frac{5}{21}$; $\frac{2}{3} \times \frac{6}{7} \times \frac{2}{9} = \frac{4}{63}$; $\frac{5}{21} \times \frac{63}{4} = \frac{3}{4}$ [= $\frac{3}{4}$ = 3 $\frac{3}{4}$ Ans.]

2. (ART. 164.) $7\frac{3}{8} = \frac{59}{8}$; $4\frac{1}{2} = \frac{9}{2}$; $\frac{59}{8} \times \frac{2}{9} = \frac{59}{36} = 1\frac{23}{36}$ Ans.

3. $3\frac{1}{2} = \frac{7}{2}$; $7\frac{1}{2} = \frac{15}{2}$; $\frac{7}{2} \times \frac{15}{15} = \frac{7}{15}$ Ans.

4. $11\frac{1}{4} = \frac{45}{4}$; $5\frac{3}{7} = \frac{38}{7}$; $\frac{45}{4} \times \frac{38}{7} = \frac{1710}{28} = 2\frac{15}{28}$ Ans.

5. $4\frac{3}{7} = \frac{31}{7}$; $1\frac{5}{8} = \frac{13}{8}$; $\frac{31}{7} \times \frac{13}{8} = \frac{403}{56} = 2\frac{55}{56}$ Ans.

6. $116\frac{3}{7} = \frac{841}{7}$; $14\frac{1}{4} = \frac{57}{4}$; $\frac{841}{7} \times \frac{57}{4} = \frac{4815}{28} = 8\frac{15}{28}$ Ans.

7. $81\frac{1}{7} = \frac{562}{7}$; $9\frac{1}{6} = \frac{55}{6}$; $\frac{562}{7} \times \frac{55}{6} = \frac{1420}{42} = 8\frac{13}{42}$ Ans.

8. $\frac{5}{6} \times \frac{11}{2} \times \frac{7}{5} = \frac{231}{20}$; $\frac{5}{8} \times \frac{33}{10} = \frac{33}{16}$; $\frac{231}{20} \times \frac{16}{33} = \frac{16}{5} =$
 $\frac{2}{2} \qquad \qquad \qquad \frac{5}{5}$ [11 $\frac{1}{5}$] Ans.

(ART. 165, p. 165.)

4. $\frac{12}{\frac{3}{7}} = \frac{12}{1} \times \frac{7}{3} = \frac{28}{1} = 28$ [Ans.]

5. $\frac{3}{14} = \frac{3}{7} \times \frac{1}{2} = \frac{3}{14}$ Ans.

6. $\frac{47}{9} = \frac{39}{8} \times \frac{1}{9} = \frac{13}{72}$ Ans.

7. $\frac{8}{9\frac{3}{10}} = \frac{8}{9} \times \frac{10}{13} = \frac{80}{117}$ Ans.

8. $\frac{7}{4\frac{1}{2}} = \frac{7}{8} \times \frac{2}{9} = \frac{7}{36}$ Ans.

9. $\frac{6\frac{3}{4}}{\frac{3}{4}} = \frac{27}{4} \times \frac{4}{3} = \frac{9}{1} = 9$ Ans.

10. $\frac{7\frac{1}{4}}{15\frac{1}{2}} = \frac{31}{4} \times \frac{2}{31} = \frac{1}{2}$ Ans.

11. $\frac{3}{4\frac{1}{2}} = \frac{3}{4} \times \frac{12}{11} = \frac{9}{11}$ Ans.

12. $\frac{15}{\frac{3}{4}} = \frac{15}{1} \times \frac{4}{3} = \frac{20}{1} = 20$ [Ans.]

13. $\frac{3}{15} = \frac{3}{4} \times \frac{1}{15} = \frac{1}{20}$ Ans.

14. $\frac{5\frac{3}{4}}{10} = \frac{23}{4} \times \frac{1}{10} = \frac{23}{40}$ Ans.

15. $\frac{6}{8\frac{1}{3}} = \frac{6}{1} \times \frac{3}{25} = \frac{18}{25}$ Ans.

16. $\frac{5}{7\frac{1}{4}} = \frac{5}{6} \times \frac{4}{31} = \frac{20}{186}$ Ans.

17. $\frac{8\frac{3}{4}}{\frac{3}{5}} = \frac{35}{4} \times \frac{5}{2} = \frac{175}{8} = 21\frac{7}{8}$ [Ans.]

18. $\frac{9\frac{3}{5}}{12\frac{1}{2}} = \frac{48}{5} \times \frac{2}{25} = \frac{96}{125}$ Ans.

19. $\frac{9\frac{1}{4}}{12\frac{7}{8}} = \frac{37}{4} \times \frac{8}{103} \times \frac{1}{7} = \frac{74}{721}$ [Ans.]

20. $\frac{\frac{3}{4}}{\frac{3}{8}} = \frac{3}{4} \times \frac{8}{3} \times \frac{1}{2} = \frac{8}{4}$ Ans.

(ART. 166, p. 167.)

$$1. \frac{1}{\frac{1}{3}} = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}; \frac{\frac{4}{1}}{12\frac{1}{2}} = \frac{4}{1} \times \frac{1}{25} = \frac{4}{25}; \frac{1}{9} + \frac{4}{25} = \frac{25+9}{225} \\ + \frac{100}{225} = \frac{125}{225} = \frac{5}{9} \text{ Ans.}$$

$$2. \frac{7\frac{7}{8}}{4} = \frac{31}{4} \times \frac{7}{4} = \frac{217}{16}; \frac{7}{\frac{7}{12}} = \frac{7}{1} \times \frac{12}{7} = 12; \frac{217}{16} + 12 = \frac{249}{16} \\ + \frac{192}{16} = \frac{441}{16} = 25 \frac{9}{16} \text{ Ans.}$$

$$3. \frac{\frac{3}{5}}{\frac{5}{12}} = \frac{3}{5} \times \frac{12}{5} = \frac{36}{25}; \frac{\frac{7}{5}}{\frac{8}{5}} = \frac{7}{8} \times \frac{5}{5} = \frac{7}{8}; \frac{\frac{1}{3}}{\frac{2}{3}} = \frac{1}{2} \times \frac{3}{2} = \frac{3}{4}; \\ \frac{36}{25} + \frac{7}{8} + \frac{3}{4} = \frac{288}{200} + \frac{875}{200} + \frac{150}{200} = \frac{1313}{200} = 24 \frac{13}{20} \text{ [Ans.]}$$

$$4. \frac{\frac{3}{5}}{15} = \frac{3}{4} \times \frac{1}{15} = \frac{1}{20}; \frac{15}{\frac{3}{4}} = \frac{15}{1} \times \frac{4}{3} = \frac{20}{1}; \frac{1}{20} + \frac{20}{1} = 20 \frac{1}{20} \text{ [Ans.]}$$

$$5. \frac{2\frac{2}{5}}{3\frac{1}{4}} = \frac{19}{8} \times \frac{4}{15} = \frac{76}{120} = \frac{19}{30}; \frac{19}{30} \times \frac{1}{2} = \frac{19}{60}; \frac{19}{60} - \frac{1}{6} = \frac{13}{60} - \frac{10}{60} \\ = \frac{3}{60} = \frac{1}{20} \text{ [Ans.]}$$

$$6. \frac{18\frac{7}{12}}{\frac{5}{8}} = 18 + \frac{7}{12} \times \frac{8}{5} = 18\frac{14}{15} = 28\frac{4}{15}; \frac{6\frac{2}{3}}{\frac{3}{4}} = \frac{20}{3} \times \frac{4}{3} = \\ \frac{140}{9}; 28\frac{4}{15} - \frac{140}{9} = \frac{852}{45} - \frac{700}{45} = \frac{152}{45} = 3\frac{7}{15} \text{ Ans.}$$

$$7. \frac{\frac{3}{5}}{8\frac{1}{2}} = \frac{3}{5} \times \frac{17}{17} = \frac{51}{85}; \frac{3}{5} \times \frac{2}{3} = \frac{2}{5}; \frac{51}{85} - \frac{2}{5} = \frac{48}{85} - \frac{34}{85} \\ = \frac{14}{85} = \frac{2}{5} \text{ Ans.}$$

$$8. \frac{6\frac{2}{3}}{\frac{3}{4}} = \frac{20}{4} \times \frac{4}{3} = \frac{20}{3}; \frac{\frac{1}{3}}{\frac{3}{4}} = \frac{1}{3} \times \frac{4}{3} = \frac{4}{9}; \frac{20}{3} - \frac{4}{9} = \frac{60}{9} - \frac{4}{9} \\ = \frac{56}{9} = 6\frac{2}{9} \text{ Ans.}$$

$$9. \frac{8\frac{3}{5}}{\frac{5}{2}} = \frac{43}{5} \times \frac{2}{5} = \frac{86}{25}; \frac{5\frac{1}{2}}{10} = \frac{21}{4} \times \frac{1}{10} = \frac{21}{40}; \frac{86}{25} - \frac{21}{40} = \\ \frac{875}{200} - \frac{21}{200} = \frac{852}{200} = 21\frac{12}{20} = 21\frac{3}{5} \text{ Ans.}$$

$$10. \frac{\frac{3}{5}}{12\frac{1}{2}} = \frac{3}{7} \times \frac{1}{12} = \frac{1}{28}; \frac{8}{\frac{4}{5}} = \frac{8}{5} \times \frac{5}{4} = \frac{40}{20}; \frac{\frac{40}{10}}{\frac{1}{28}} \times \frac{1}{28} = \\ \frac{10}{7} = 1\frac{3}{7} \text{ Ans.}$$

11. $\frac{4}{11} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}; \frac{3\frac{1}{2}}{7\frac{1}{2}} = \frac{15}{4} \times \frac{8}{37} = \frac{120}{148} = \frac{120}{148} \times \frac{1}{1} = \frac{120}{148}$ Ans.

12. $\frac{3}{4} \times \frac{8\frac{1}{2}}{6\frac{1}{2}} = \frac{3}{4} \times \frac{44}{5} \times \frac{5}{32} = \frac{33}{32}; \frac{1}{4} \times \frac{4}{16} = \frac{4}{9} \times \frac{2}{7} \times \frac{1}{16} = \frac{11}{128}; \frac{33}{32} \times \frac{1}{128} = \frac{33}{128}$ Ans.

13. $\frac{3\frac{1}{2}}{5\frac{1}{4}} = \frac{7}{2} \times \frac{4}{23} = \frac{14}{23}; \frac{6\frac{1}{4}}{2\frac{1}{4}} = \frac{25}{4} \times \frac{9}{22} = \frac{225}{88} = \frac{225}{88} \times \frac{14}{23} = \frac{1575}{1012} = 1\frac{563}{1012}$ Ans.

14. $\frac{4}{7} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}; \frac{12}{11} = \frac{12}{7} \times \frac{1}{11} = \frac{12}{77}; \frac{20}{49} \times \frac{77}{63} = \frac{20}{7} \times \frac{77}{3} = \frac{220}{21}$ Ans.

15. $\frac{3\frac{1}{2}}{7\frac{1}{2}} = \frac{25}{7} \times \frac{6}{17} = \frac{150}{119}; \frac{1}{2} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}; \frac{150}{119} \times \frac{8}{21} = \frac{400}{2383}$ Ans.

16. $\frac{7}{11} \times 12\frac{1}{2} = \frac{7}{11} \times \frac{11}{4} \times \frac{25}{2} = \frac{1825}{44}; \frac{3}{7\frac{1}{2}} \times 8\frac{1}{4} = \frac{1}{2} \times \frac{275}{48} \times \frac{3}{7} = \frac{1925}{48} \times \frac{18}{7} = \frac{825}{14} = 103\frac{1}{2}$ Ans.

17. $\frac{4\frac{1}{3}}{3\frac{1}{6}} = \frac{13}{3} \times \frac{5}{16} = \frac{65}{48}; \frac{5\frac{1}{4}}{2\frac{1}{6}} = \frac{21}{4} \times \frac{6}{13} = \frac{63}{26}; \frac{63}{26} \times \frac{63}{26} = \frac{1365}{416}; \frac{63}{14} = \frac{13}{2} \times \frac{7}{11} = \frac{91}{22}; \frac{21}{8} = \frac{7}{4} \times \frac{3}{2} = \frac{21}{8}$

$\frac{1365}{416} \times \frac{153}{16} = \frac{1365}{416} \times \frac{55}{663} = \frac{1365}{13923}$ Ans.

MISCELLANEOUS EXERCISES IN VULGAR FRACTIONS.

(PAGE 168.)

$$1. 76\frac{7}{25} = \frac{1917}{25}; 18\frac{3}{4} = \frac{75}{4}; \frac{1907}{25} \times \frac{75}{4} = \frac{1430\frac{1}{4}}{3} = 1430\frac{1}{4} \text{ p.}$$

3

$$= 8A. 3R. 30\frac{1}{4} \text{ p. Ans.}$$

$$2. 7\frac{1}{2} = \frac{15}{4}; 1\frac{3}{4} = \frac{7}{4}; 1\frac{1}{4} = \frac{5}{4}; \frac{31}{4} \times \frac{7}{4} \times \frac{5}{4} \times \frac{10}{1} = \frac{1435}{2}$$

$$= 169\frac{17}{2} \text{ cubic feet. Ans.}$$

3. $\frac{7}{11}$ of an acre = 2R. 21p. $222\frac{3}{4}$ ft. From this we subtract
20p. 200ft.; and there remain 2R. 1p. $22\frac{3}{4}$ ft. =
 22075 ft. Ans.

$$4. \frac{1}{3} \times \frac{160}{3} \times \frac{175}{5} = \frac{10800}{9} = \$ 236.92\frac{1}{3} \text{ Ans.}$$

$$5. 15\frac{3}{4} = \frac{63}{4}; \frac{3}{19} \times \frac{20}{1} \times \frac{63}{4} = \frac{843}{4} = \$ 49.73\frac{1}{3} \text{ Ans.}$$

5

$$6. 14\frac{2}{5} = \frac{72}{5}; 11\frac{3}{7} = \frac{80}{7}; 5\frac{4}{5} = \frac{49}{5}; 10\frac{1}{4} = \frac{41}{4}; \frac{72}{5} \times \frac{80}{7} \times$$

8 4

$$\frac{49}{5} \times \frac{41}{4} = 9184 \text{ Ans.}$$

7

$$7. \frac{7}{4} - \frac{1}{4} = \frac{3}{4}; \frac{7}{12} \times \frac{3}{7} = \frac{1}{4}; \frac{112}{1} \times \frac{1}{4} = \frac{28}{1}; 12\frac{3}{4} = \frac{51}{4};$$

7 4

$$\frac{51}{4} \times \frac{28}{1} = \frac{147}{1} = \$ 3.57 \text{ Ans.}$$

$$8. 19\frac{3}{7} = \frac{136}{7}; 7\frac{3}{8} = \frac{59}{8}; \frac{136}{7} \times \frac{59}{8} = \frac{1003}{7} = \$ 143\frac{3}{7} \text{ Ans.}$$

17

$$9. 13\frac{8}{11} = \frac{153}{11}; 3\frac{3}{4} = \frac{15}{4}; \frac{153}{11} \times \frac{15}{4} = \frac{23085}{44} =$$

$$\$ 512\frac{37}{44} \text{ Ans.}$$

10. $7\frac{7}{10} = 7\frac{7}{10}$; $9\frac{11}{12} = 9\frac{11}{12}$; $7\frac{7}{10} + 9\frac{11}{12} = 17\frac{23}{60} = 18\frac{7}{60}$;

$$78\frac{3}{8} = 78\frac{3}{8}; \frac{1057}{60} \times \frac{627}{8} = \frac{220913}{160} = \$1380.70\frac{3}{8} \text{ Ans.}$$

11. $175\frac{3}{8} = 175\frac{3}{8}$; $\frac{3}{8} - \frac{3}{8} = 0$; $\frac{3}{8} \times \frac{3}{8} = \frac{1}{2}\frac{1}{8}$; $\frac{3}{8} - \frac{3}{8} = 0$;

$$\frac{175}{8} \times \frac{3}{8} = 17\frac{5}{8}; 8\frac{3}{4} = \frac{35}{4}; \frac{175}{8} \times \frac{35}{4} = \frac{3073}{16} = \$2.04\frac{3}{8} \text{ Ans.}$$

12. $475 \div 3 = 158\frac{1}{3}$; $158\frac{1}{3} \times .08 = \$12.66\frac{2}{3}$; $475 - 158\frac{1}{3}$

$$= 316\frac{2}{3}; \frac{2}{3} \times 316\frac{2}{3} = 211\frac{1}{3}; 211\frac{1}{3} \times .10 = \$21.11\frac{1}{3}$$

$$316\frac{2}{3} - 211\frac{1}{3} = 105\frac{1}{3}; 105\frac{1}{3} \times .12\frac{1}{2} = \$13.19\frac{1}{3} \text{ Ans.}$$

$$\$21.11\frac{1}{3} + \$12.66\frac{2}{3} + \$13.19\frac{1}{3} = \$46.97\frac{2}{3}; \$46.97\frac{2}{3} - \$30.00 = \$16.97\frac{2}{3}, \text{ Green's bargain, Ans.}$$

$$13. 14\frac{3}{7} = 14\frac{1}{7}; \frac{14}{14} \times \frac{101}{101} = \$2.00 \text{ Ans.}$$

$$14. \frac{7}{8} \times \frac{8}{11} \times \frac{11}{14} = \frac{1}{2}; \frac{5}{17} \times \frac{17}{19} \times \frac{19}{25} = \frac{1}{5}; \frac{1}{2} \times \frac{1}{5} = \frac{1}{10} \text{ [Ans.]}$$

15. $11\frac{2}{4} = 11\frac{1}{4}$; $4\frac{1}{4} = 4\frac{1}{4}$; $4\frac{1}{4} \times 4\frac{1}{4} = 11\frac{9}{16} = 49\frac{1}{16}$ sq. in. Ans.

16. $18\frac{3}{4} = 18\frac{9}{16}$; $9\frac{7}{10} = 9\frac{7}{10}$; $18\frac{9}{16} \times 9\frac{7}{10} = 178\frac{13}{16} = 178\frac{13}{16}$ rods, Ans.

17. $19\frac{3}{4} = 19\frac{9}{16}$; $17\frac{3}{4} = 17\frac{9}{16}$; $17\frac{9}{16} \times 19\frac{9}{16} = 350\frac{9}{16} = \$350\frac{9}{16}$ Ans.

18. $14\frac{7}{10} = 14\frac{7}{10}$; $7\frac{3}{4} = 7\frac{3}{4}$; $14\frac{7}{10} \times 7\frac{3}{4} = 111\frac{7}{16} = \$111\frac{7}{16}$ Ans.

19. $13\frac{1}{2} = 13\frac{1}{2}$; $8\frac{7}{8} = 8\frac{7}{8}$; $13\frac{1}{2} \times 8\frac{7}{8} = 120\frac{1}{16}$ Ans.

20. $1\frac{1}{5} = 1\frac{1}{5}$; $1\frac{1}{5} = 1\frac{1}{5}$; $1\frac{1}{5} \times 1\frac{1}{5} = 2\frac{2}{25} = \$3\frac{3}{25}$ Ans.

$$21. \frac{9}{16} \times \frac{100}{1} = 22\frac{1}{4} = \$0.56\frac{1}{4} \text{ Ans.}$$

$$22. \frac{17}{80} \times \frac{100}{1} = 21\frac{1}{4} = \$0.21\frac{1}{4} \text{ Ans.}$$

$$23. \frac{41}{160} \times \frac{100}{1} = \frac{205}{8} = \$0.25\frac{5}{8} \text{ Ans.}$$

$$24. \frac{33}{64} \times \frac{100}{1} = \frac{825}{16} = \$0.51\frac{9}{16} \text{ Ans.}$$

$$25. \text{As } \frac{3}{8} \text{ leaked out, } \frac{5}{8} \text{ remained in the cask, therefore } 87\frac{1}{2} = \\ 17\frac{1}{2}; \frac{5}{8} \times 17\frac{1}{2} = \frac{875}{16}; 27\frac{1}{2} = \frac{55}{2}; \frac{875}{16} \times \frac{55}{2} = \frac{48125}{32} \\ = \$15.03\frac{25}{32} \text{ Ans.}$$

$$26. 7\frac{3}{8} = \frac{59}{8}; 3\frac{7}{8} = \frac{31}{8}; \frac{59}{8} \times \frac{31}{8} = \frac{1829}{64}; 4\frac{3}{8} = \frac{35}{8}; \frac{59}{8} \times \\ \frac{35}{8} = \frac{2085}{64}; \frac{2085}{64} - \frac{1829}{64} = \frac{256}{64} = \$3.68\frac{3}{4} \text{ Ans.}$$

$$27. 47\frac{5}{11} = \frac{522}{11}; 29\frac{7}{16} = \frac{471}{16}; \frac{522}{11} \times \frac{471}{16} = \frac{123881}{16} = \\ 8$$

$1396\frac{3}{8}$ square rods; $5 \times 5 = 25$; $25 + 5 = 30$; $1396\frac{3}{8}$ — $30 = 1366\frac{3}{8}$ square rods, Ans.

$$28. 48\frac{1}{16} = \frac{77}{16}; \frac{77}{16} \times \frac{97}{1} = \frac{75563}{16} = 4722\frac{11}{16} \text{ square rods;} \\ 18\frac{5}{12} = \frac{221}{12}; 14\frac{3}{8} = \frac{115}{8}; \frac{221}{12} \times \frac{115}{8} = \frac{25415}{96} = 264\frac{7}{96} \text{ square rods;} \\ 4722\frac{11}{16} - 264\frac{7}{96} = 4457\frac{9}{96}; 4457\frac{9}{96} \times \\ \$3.75 = \$16717.30\frac{5}{8} \text{ Ans.}$$

$$29. 7\frac{3}{4} = \frac{31}{4}; 4\frac{5}{12} = \frac{53}{12}; 3\frac{5}{8} = \frac{29}{8}; \frac{31}{4} \times \frac{53}{12} \times \frac{29}{8} = \frac{27789}{288}; \\ \frac{37789}{288} \times \frac{10}{1} = \frac{188945}{144} = 1312\frac{17}{144} \text{ feet, Ans.}$$

$$30. \$17.87\frac{1}{2} \div 2 = \$8.93\frac{3}{4}. \text{ Now, if } \frac{2}{3} \text{ of this sum were given to the Bible Society, } \frac{2}{3} \text{ of it will remain; therefore,} \\ \$8.93\frac{3}{4} \times \frac{2}{3} = \$3.57\frac{1}{2} \text{ Ans.}$$

$$31. 10\frac{4}{5} = \frac{54}{5}; 50 \times 5 = 250; 250 \div 54 = 4\frac{17}{54}; 12\frac{3}{4} - 4\frac{17}{54} \\ = 8\frac{13}{108} \text{ Ans.}$$

$$32. 7\frac{3}{8} = \frac{59}{8}; 20 \times 8 = 160; 160 \div 59 = 2\frac{42}{59} \text{ Ans.}$$

$$33. 9\frac{7}{8} = \frac{79}{8}; \$4.62\frac{1}{2} = \frac{935}{2}; \frac{79}{8} \times \frac{935}{2} = \frac{73075}{16} = \$45.67\frac{3}{8} \\ \text{Ans.}$$

34. $47\frac{3}{4} = 1\frac{21}{4}$; $\$ 12.37\frac{1}{2} = 24\frac{75}{2}$; $12\frac{7}{8} = 1\frac{9}{8}$; $\frac{2475}{2} \times \frac{4}{191}$

$$\begin{array}{r} \times \frac{103}{8} \\ \hline 2 \end{array} = \frac{2475 \times 103}{2 \times 8} = \$ 3.33\frac{1}{8} \text{ Ans.}$$

35. $\$ 15.87\frac{1}{2} = 31\frac{75}{2}$; $12\frac{3}{8} = 9\frac{9}{8}$; $\frac{3175}{2} \times \frac{8}{9} \times \frac{11}{1} = 127\frac{100}{9}$
 $= \$ 14.11\frac{1}{8}$ Ans.

36. $\$ 19.18\frac{3}{4} = 76\frac{75}{4}$; $3\frac{3}{8} = \frac{27}{8}$; $\frac{7675}{4} \times \frac{8}{27} \times \frac{3}{8} = 7\frac{75}{36} = \$ 2.13\frac{7}{36}$ Ans.

37. $8\frac{1}{2} = 1\frac{1}{2}$; $3\frac{1}{2} = \frac{1}{2}$; $2\frac{1}{2} = \frac{1}{2}$; $1\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = 1\frac{1}{2}\frac{75}{72} = 68\frac{1}{2}\frac{1}{8}$ feet, Ans.

38. If $\frac{2}{3}$ of this field be planted with corn, $\frac{1}{3}$ of the field will remain unplanted. And, if $\frac{2}{3}$ of this remainder be sown with wheat, then there will remain $\frac{1}{3}$ of the whole field; because, if $\frac{2}{3}$ of $\frac{1}{3} = \frac{2}{9}$ be taken from $\frac{1}{3}$, the remainder will be $\frac{1}{3}$; thus, $\frac{1}{3} - \frac{2}{9} = \frac{1}{9}$. If, then, $\frac{2}{3}$ of this $\frac{1}{9}$ be planted with potatoes, $\frac{1}{3}$ of the $\frac{1}{9}$ will remain; and $\frac{1}{3}$ of $\frac{1}{9}$ is $\frac{1}{27}$. That is, the 3 rods square and the 3 square rods are $\frac{4}{9}$ of the whole field; but 3 rods square are 9 square rods; and if, to these, we add the 3 square rods, the whole amount will be 12 square rods. If, then, 12 square rods be $\frac{4}{9}$ of the field, 3 square rods will be $\frac{1}{9}$ of the field; and, if $\frac{1}{9}$ of the field be 3 rods, $\frac{63}{3}$, or the whole field, will be 63 times as much, that is, $63 \times 3 = 189$ square rods = 1A. 0R. 29p. Ans.

2. (ART. 167, p. 171.) $\frac{1}{1400} \times \frac{20}{1} \times \frac{12}{1} \times \frac{4}{1} = \frac{2}{5}$ Ans.

$$\begin{array}{r} 70 \\ \times 35 \\ \hline 35 \end{array}$$

3. $\frac{4}{75} \times \frac{12}{1} = \frac{48}{75}$ Ans.

$$4. \frac{1}{8640} \times \frac{18}{1} \times \frac{20}{1} \times \frac{24}{1} = \frac{2}{3} \text{ Ans.}$$

720
 36
 3

$$5. \frac{1}{1728} \times \frac{4}{1} \times \frac{28}{1} \times \frac{16}{1} = \frac{4}{3} = 1\frac{1}{3} \text{ Ans.}$$

432
 27

$$6. \frac{1}{1320} \times \frac{40}{1} \times \frac{16\frac{1}{2}}{1} = \frac{1}{2} \text{ Ans.}$$

33
 2

$$7. \frac{1}{58080} \times \frac{160}{1} \times \frac{272\frac{1}{2}}{1} = \frac{272\frac{1}{2}}{363} = 1\frac{112}{363} = \frac{2}{3} \text{ Ans.}$$

363
 3

$$8. \frac{1}{89600} \times \frac{24}{1} \times \frac{60}{1} \times \frac{60}{1} = \frac{4}{3} \text{ Ans.}$$

11200
 28

$$9. \frac{3}{14} \times \frac{4}{1} = \frac{6}{7} \text{ Ans.}$$

7

$$10. \frac{1}{280} \times \frac{4}{1} \times \frac{28}{1} = \frac{14}{5} \text{ Ans.}$$

56
 25

$$2. (\text{ART. 168.}) \frac{4}{7} \times \frac{1}{24} \times \frac{1}{20} \times \frac{1}{12} = \frac{1}{10080} \text{ Ans.}$$

6

$$3. \frac{3}{10} \times \frac{1}{3} \times \frac{1}{8} = \frac{1}{80} \text{ Ans.}$$

$$4. \frac{4}{5} \times \frac{1}{16} \times \frac{1}{28} \times \frac{1}{4} \times \frac{1}{20} = \frac{1}{44800} \text{ Ans.}$$

4

5. $\frac{8}{9} \times \frac{1}{40} \times \frac{1}{8} = \frac{1}{360}$ Ans.

6. $\frac{2}{3} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{2} = \frac{1}{85340}$ Ans.

7. $\frac{24}{25} \times \frac{1}{60} \times \frac{1}{60} \times \frac{1}{24} = \frac{1}{90000}$ Ans.

8. $\frac{4}{9} \times \frac{1}{272\frac{1}{4}} \times \frac{1}{40} \times \frac{1}{4} \times \frac{1}{3} = \frac{1}{291600}$

9. $\frac{4}{7} \times \frac{1}{4} \times \frac{1}{63} \times \frac{1}{3} = \frac{1}{1323}$ Ans.

10. A solid foot contains 1728 cubic inches, and $\frac{1}{6}$ of 1728 is 288. One sixth of a yard is 6 inches, and a cube whose sides measure 6 inches each contains $6 \times 6 \times 6 = 216$ cubic inches, and 216 is $\frac{3}{4}$ of 288; thus $\frac{216}{288} = \frac{3}{4}$ Ans.

(ART. 169, p. 173.)

| (2.) | (3.) | (4.) | |
|-----------------|--------------------------|-------------------|------------------------|
| $\frac{7}{4}$ | $\frac{7}{4}$ | $\frac{3}{4}$ | |
| $\frac{27}{9}$ | $\frac{27}{9}$ | $\frac{7}{7}$ | (Brought up.) |
| $\frac{1}{28}$ | $\frac{1}{28}$ | $\frac{5}{40}$ | |
| $\frac{27}{9}$ | $\frac{4}{9}$ | $\frac{35}{35}$ | |
| $\frac{27}{9}$ | $\frac{0\frac{4}{3}}{9}$ | $\frac{39}{39}$ | |
| $\frac{1}{16}$ | | $\frac{35}{4}$ | |
| $\frac{9}{9}$ | | $\frac{4}{4}$ | |
| $\frac{7}{7}$ | | $\frac{56}{56}$ | |
| $\frac{16}{9}$ | | $\frac{144}{144}$ | |
| $\frac{108}{9}$ | | $\frac{576}{576}$ | (82 $\frac{2}{3}$ in.) |
| $\frac{4}{4}$ | | $\frac{56}{56}$ | |
| $\frac{108}{9}$ | | $\frac{16}{16}$ | |
| $\frac{112}{9}$ | | $\frac{14}{14}$ | |
| $\frac{108}{4}$ | | $\frac{2}{2}$ | |

| (5.) | (6.) | (7.) | (8.) |
|---------------------------------|--|-----------------------|---|
| 2 | 3 | 2 | 7 |
| 8 | 5 | 63 | <u>965</u> ₄ |
| <u>9) 16</u> (1fur. | <u>11) 15</u> (1qr. | <u>7) 126</u> (18gal. | <u>11) 2556</u> ₄ (232d. |
| <u>9</u> | <u>11</u> | <u>7</u> | <u>22</u> |
| <u>7</u> | <u>4</u> | <u>56</u> | <u>35</u> |
| <u>40</u> | <u>4</u> | <u>56</u> | <u>33</u> |
| <u>9) 280</u> (31rd. | <u>11) 16</u> (1 ₁ ¹ na. | | |
| <u>27</u> | <u>11</u> | | |
| <u>10</u> | <u>5</u> | | |
| <u>9</u> | | | |
| <u>1</u> | | | |
| <u>16</u> ₂ | | | |
| <u>9) 16</u> ₂ (1ft. | | | <u>11) 114</u> (10h. |
| <u>9</u> | | | <u>110</u> |
| <u>7</u> ₄ | | | <u>4</u> |
| <u>12</u> | | | <u>60</u> |
| <u>9) 90</u> (10in. | | | <u>11) 240</u> (21m. |
| <u>90</u> | | | <u>22</u> |
| <u>—</u> | | | <u>20</u> |
| | | | <u>11</u> |
| | | | <u>9</u> |
| | | | <u>60</u> |
| | | | <u>11) 540</u> (49 ₁ ¹ s. |
| | | | <u>44</u> |
| | | | <u>100</u> |
| | | | <u>99</u> |
| | | | <u>1</u> |

(ART. 170, p. 173.)

$$\begin{array}{l} (2.) \\ 4s. 8d. = \frac{56}{240} = \frac{7}{30} \text{ Ans.} \end{array} \quad \begin{array}{l} (3.) \\ 4\text{cwt. } 3\text{qr. } 12\text{lb.} = \frac{544}{2240} = \frac{136}{560} \text{ Ans.} \end{array}$$

$$\begin{array}{l} (4.) \\ 2\text{fur. } 30\text{rd.} = \frac{110}{780} = \frac{11}{78} \text{ Ans.} \end{array} \quad \begin{array}{l} (5.) \\ 3R. 24p. = \frac{144}{432} = \frac{3}{8} \text{ Ans.} \\ 2A. 2R. 32p. = \frac{432}{432} = 1 \text{ Ans.} \end{array}$$

(6.)

$$18\text{gal. } 2\text{qt.} = \frac{74}{252} = \frac{37}{126} \text{ Ans.} \quad \left| \begin{array}{l} 8\text{d. } 17\text{h. } 20\text{m.} = \frac{12560}{30\text{d.}} \\ = \frac{12560}{43200} = \frac{147}{540} \text{ Ans.} \end{array} \right.$$

(8.)

$$\begin{array}{l} 5\text{yd. } 2\text{qr. } 2\text{na.} = \frac{90}{210} = \frac{3}{7} \text{ Ans.} \\ 13\text{yd. } 0\text{qr. } 2\text{na.} = \frac{210}{3} = \frac{3}{9} = \frac{1}{3} \text{ Ans.} \end{array}$$

(7.)

(9.)

$$\begin{array}{lll} (2.) & (\text{ART. 171, p. 174.}) & (3.) \\ \frac{1}{12}\text{£.} = \frac{7}{1} & \frac{3}{1} & \frac{\text{far.}}{1} \\ \frac{1}{12}\text{s.} = \frac{8}{2} & & \frac{\frac{1}{12}\text{T.}}{18} = \frac{0}{0} & \frac{20\frac{1}{4}}{1} \\ \text{Ans. } 7 & 11 & 3\frac{2}{7} & \frac{\frac{1}{12}\text{T.}}{15} = \frac{2}{6\frac{2}{3}} \\ & & & \frac{\frac{1}{12}\text{cwt.}}{2} = \frac{8}{6\frac{2}{3}} \\ & & & \text{Ans. } 1 & 14 & 1 & 6\frac{2}{3} \end{array}$$

(4.)

$$\begin{array}{l} \text{yd. qr. na. in.} \\ \frac{2}{3}\text{yd.} = 2 \quad 2 \quad 1\frac{1}{2} \\ \frac{2}{3}\text{yd.} = 3 \quad 2 \quad 0\frac{1}{2} \\ \frac{1}{12}\text{qr.} = 1 \quad 1\frac{1}{4} \\ \text{Ans. } 1 \quad 2 \quad 2 \quad 0\frac{1}{2} \end{array}$$

(5.)

$$\begin{array}{l} \text{fur. rd. yd. ft. in.} \\ \frac{1}{12}\text{m.} = 2 \quad 36 \quad 2 \quad 0 \quad 0 \\ \frac{1}{12}\text{m.} = 3 \quad 22 \quad 1 \quad 0 \quad 8 \\ \frac{1}{12}\text{fur.} = 10 \quad 5 \quad 0 \quad 0 \\ \frac{1}{12}\text{yd.} = 1 \quad 10\frac{1}{2} \\ \text{Ans. } 6 \quad 29 \quad 2\frac{1}{2} \quad 2 \quad 6\frac{1}{2} \\ \frac{1}{2}=1 \quad 6 \end{array}$$

$$\begin{array}{lll} (6.) & & (7.) \\ \text{A. R. p. ft. in.} & & \text{R. p. ft.} \\ \frac{1}{12}\text{A.} = 3 & 10 & 247 & 72 \\ \frac{1}{12}\text{R.} = 0 & 194 & & 66\frac{2}{3} \\ \frac{1}{12}\text{p.} = 32 & 0 & 0 & \frac{1}{12}\text{A.} = 0 & 37 & 176\frac{1}{3} \\ & 1 & 0 & 3 & 168\frac{2}{3} & 138\frac{2}{3} \\ & & & & \frac{3}{4}=108 & \\ & & & & \text{Ans. } 3 & 38 & 45\frac{8}{25} \end{array}$$

$$\text{Ans. } 1 \quad 0 \quad 3 \quad 169 \quad 102\frac{2}{7}$$

(2.) (ART. 172, p. 175.)

$$\begin{array}{l} \frac{1}{12}\text{T.} = \frac{\text{cwt.}}{11} \quad \frac{\text{qr.}}{1} \quad \frac{\text{lb.}}{20} \\ \frac{1}{12}\text{cwt.} = \frac{1}{1} \quad \frac{11\frac{1}{2}}{11} \end{array}$$

$$\text{Ans. } 11 \quad 0 \quad 8\frac{8}{17}$$

(3.)

$$\begin{array}{l} \frac{1}{12}\text{m.} = \frac{\text{fur.}}{6} \quad \frac{\text{rd.}}{8} \quad \frac{\text{ft.}}{14} \quad \frac{\text{in.}}{8} \\ \frac{1}{12}\text{fur.} = \frac{15}{1} \quad 9 \quad 2 \end{array}$$

$$\text{Ans. } 5 \quad 33 \quad 5 \quad 6$$

$$(5.) \quad \begin{array}{r} \frac{3}{11} \times 100 \text{ gal.} \\ \frac{3}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{3}{2} = \frac{12}{11} \times 100 \text{ gal.} \\ \hline 27 & 1 & 0 \frac{2}{11} \\ 48 & 1 & 1 \frac{2}{11} \\ \hline 75 & 3 & 0 \frac{2}{11} \end{array}$$

$$(4.) \quad \begin{array}{r} \frac{R.}{A.} = \frac{3}{11} \frac{25}{11} \frac{123}{4} \\ \frac{3}{8} R. = \frac{8}{242} \\ \hline \text{Ans. } 3 & 16 & 154 \end{array} \quad \begin{array}{r} 100 & 0 & 0 \\ 75 & 3 & 0 \frac{2}{3} \\ \hline \text{Ans. } 24 & 0 & 1 \frac{2}{3} \end{array}$$

$$(6.) \quad \begin{array}{r} 41 \text{ m.} \times \frac{3}{11} \\ \frac{4}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{3}{2} = \frac{12}{11} \times 41 \text{ m.} \\ \hline 11 & 1 & 18 & 3 & 0 \\ 17 & 0 & 12 & 7 & 8 \frac{1}{2} \\ \hline 28 & 1 & 30 & 10 & 8 \frac{1}{2} \\ 41 & 0 & 0 & 0 & 0 \\ 28 & 1 & 30 & 10 & 8 \frac{1}{2} \\ \hline \text{Ans. } 12 & 6 & 9 & 5 & 9 \frac{1}{2} \end{array}$$

$$(7.) \quad \begin{array}{r} 365 \text{ da.} \times \frac{1}{4} \\ \frac{1}{4} - \frac{1}{4} = \frac{1}{2} \times \frac{3}{11} = \frac{3}{22} \times 365 \text{ da.} \\ \hline 52 & 3 & 25 & 42 \frac{1}{2} \\ 85 & 7 & 47 & 31 \frac{1}{2} \\ \hline \text{Ans. } 137 & 11 & 13 & 14 \frac{1}{2} \end{array}$$

QUESTIONS PERFORMED BY ANALYSIS.

2. (p. 176.) $\$7.80 \div 10 = \0.78 ; $\$0.78 \times 3 = \2.34 Ans.
3. $\$17.84 \div 8 = \2.23 ; $\$2.23 \times 7 = \15.61 Ans.
4. $\$786.63 \div 13 = \60.51 ; $\$60.51 \times 11 = \665.61 Ans.
5. $\$87.50 \div 12 = \$7.29\frac{1}{2}$; $\$7.29\frac{1}{2} \times 11 = \$80.20\frac{1}{2}$ Ans.
6. 17£. 18s. 9d. $\div 4 = 4£. 9s. 8\frac{1}{4}d.$; $4£. 9s. 8\frac{1}{4}d. \times 3 = 13£. 9s. 0\frac{3}{4}d.$ Ans.
7. 3T. 16cwt. 3qr. 23lb. $\div 7 = 10$ cwt. 3qr. 27 $\frac{1}{2}$ lb.; 10cwt. 3qr. 27 $\frac{1}{2}$ lb. $\times 4 = 2$ T. 3cwt. 3qr. 25 $\frac{1}{2}$ lb. Ans.
8. 27A. 3R. 33p. $\div 9 = 3$ A. 0R. 17p.; 3A. 0R. 17p. $\times 4 = 12$ A. 1R. 28p. Ans.
10. $\$2.34 \div 3 = \0.78 ; $\$0.78 \times 10 = \7.80 Ans.
11. $\$15.57\frac{1}{2} \div 7 = \$2.22\frac{1}{2}$; $\$2.22\frac{1}{2} \times 8 = \17.80 Ans.
12. $\$665.50 \div 11 = \60.50 ; $\$60.50 \times 13 = \786.50 Ans.

13. $\$73.60\frac{1}{2} \div 11 = \$6.69\frac{1}{2}$; $\$6.69\frac{1}{2} \times 12 = \80.30 Ans.
14. $13\text{£. } 9\text{s. } 0\frac{1}{2}\text{d.} \div 3 = 4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.}; 4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.} \times 4 = 17\text{£. } 18\text{s. } 9\text{d.}$ Ans.
15. $18\text{cwt. } 0\text{qr. } 12\text{lb.} \div 4 = 4\text{cwt. } 2\text{qr. } 3\text{lb.}; 4\text{cwt. } 2\text{qr. } 3\text{lb.} \times 17 = 76\text{cwt. } 3\text{qr. } 23\text{lb.}$ Ans.
16. $12\text{A. } 1\text{R. } 30\frac{1}{2}\text{p.} \div 4 = 3\text{A. } 0\text{R. } 17\frac{1}{2}\text{p.}; 3\text{A. } 0\text{R. } 17\frac{1}{2}\text{p.} \times 9 = 27\text{A. } 3\text{R. } 39\frac{1}{4}\text{p.}$ Ans.
17. $\$80.20\frac{1}{2} \div 11 = \$7.29\frac{1}{2}$; $\$7.29\frac{1}{2} \times 12 = \87.50 Ans.
19. $\$2.52 \div 7 = \0.36 ; $\$0.36 \times 11 = \3.96 ; $\$3.96 \div 9 = \0.44 ; $\$0.44 \times 4 = \1.76 Ans.
20. $\$80.00 \div 3 = \$26.66\frac{2}{3}$; $\$26.66\frac{2}{3} \times 4 = \$106.66\frac{2}{3}$; $\$106.66\frac{2}{3} \div 8 = \$13.33\frac{1}{3}$; $\$13.33\frac{1}{3} \times 7 = \$93.33\frac{1}{3}$ Ans.
21. $\$631.89 \div 9 = \70.21 ; $\$70.21 \times 16 = \1123.36 ; $\$1123.36 \div 14 = \80.24 ; $\$80.24 \times 5 = \401.20 Ans.
22. $\$141.52 \div 4 = \35.38 ; $\$35.38 \times 5 = \176.90 ; $\$176.90 \div 29 = \6.10 ; $\$6.10 \times 5 = \30.50 Ans.
23. $\$1728 \div 3 = \576 ; $\$576 \times 8 = \4608 ; $\frac{5}{8} - \frac{3}{8} = \frac{2}{8}$; $\frac{5}{8} \times \frac{4}{5} = \frac{1}{2}$; $\$4608 \times \frac{1}{2} = \2304 Ans.
24. $\$82.80 \div 4 = \20.70 ; $\$20.70 \times 7 = \144.90 ; $\frac{7}{4} - \frac{3}{7} = \frac{3}{7}$; $\frac{3}{7} \times \frac{2}{3} = \frac{2}{7}$; $\$144.90 \div 7 = \20.70 ; $\$20.70 \times 2 = \41.40 Ans.
25. $26\text{£. } 12\text{s. } 6\text{d.} \div 5 = 5\text{£. } 6\text{s. } 6\text{d.}; 5\text{£. } 6\text{s. } 6\text{d.} \times 9 = 47\text{£. } 18\text{s. } 6\text{d.}$; $\frac{6}{5} - \frac{3}{5} = \frac{3}{5}$; $\frac{3}{5} \times \frac{7}{9} = \frac{7}{15}$; $47\text{£. } 18\text{s. } 6\text{d.} \div 2 = 23\text{£. } 13\text{s. } 3\text{d.}$; $23\text{£. } 13\text{s. } 3\text{d.} \times 7 = 18\text{£. } 12\text{s. } 9\text{d.}$ Ans.
27. $\$49.00 \div 3 = \$16.33\frac{1}{3}$; $\$16.33\frac{1}{3} + 11 = \$1.48\frac{1}{3}$; $\$1.48\frac{1}{3} \times 81 = \$120.27\frac{3}{4}$ Ans.
28. $\$78.80 \div 11 = \$7.16\frac{4}{11}$; $\$7.16\frac{4}{11} \div 9 = \$0.79\frac{5}{9}$; $\$0.79\frac{5}{9} \times 31 = \$24.67\frac{7}{9}$ Ans.

29. $37\text{£. } 18\text{s. } 10\text{d.} + 3 = 12\text{£. } 12\text{s. } 11\frac{1}{2}\text{d.};$ $12\text{£. } 12\text{s. } 11\frac{1}{2}\text{d.} + 8 = 1\text{£. } 11\text{s. } 7\frac{5}{12}\text{d.};$ $1\text{£. } 11\text{s. } 7\frac{5}{12}\text{d.} \times 43 = 67\text{£. } 19\text{s. } 6\frac{1}{2}\text{d.}$ Ans.
30. $\$40 + 5 = \$8.00;$ $\$8.00 + 7 = \$1.14\frac{1}{7};$ $\$1.14\frac{1}{7} \times 137 = \$156.57\frac{1}{7}$ Ans.
31. $\$360 \div 20 = \$18;$ $\$18 \div 6 = \$3;$ $\$3 \times 263 = \789 Ans.
32. $\$8.75 \div 7 = \$1.25;$ $\$1.25 \div 11 = \$0.11\frac{4}{11};$ $\$0.11\frac{4}{11} \times 205 = \$23.29\frac{5}{11}$ Ans.
33. $\$19.80 \div 3 = \$6.60;$ $\$6.60 \div 7 = \$0.94\frac{2}{7};$ $\$0.94\frac{2}{7} \times 81 = \$76.37\frac{1}{7}$ Ans.
35. $3\text{cwt.} \div 151 = 1\frac{3}{151};$ $1\frac{3}{151} \times \frac{1}{4} = \frac{24}{151};$ $\frac{24}{151} \times \frac{7}{1} = \frac{1872}{151} = 12\frac{60}{151}$ cwt. Ans.
36. $\$276.18 \div 24 = \$11.50\frac{3}{4};$ $\$11.50\frac{3}{4} \times 7 = \$80.55\frac{1}{4};$ $\$80.55\frac{1}{4} \times 75 = \$6041.43\frac{3}{4}$ Ans.
37. $\$875.00 \div 81 = \$10.80\frac{11}{11};$ $\$10.80\frac{11}{11} \times 11 = \$118.82\frac{11}{11};$ $\$118.82\frac{11}{11} \times 75 = \$8912.03\frac{11}{11}$ Ans.
38. $\$70 \div 35 = \$2;$ $\$2 \times 8 = \$16;$ $\$16 \times 86 = \1376 Ans.
39. $\$375.00 \div 111 = \$3.37\frac{8}{11};$ $\$3.37\frac{8}{11} \times 4 = \$13.51\frac{3}{11};$ $\$13.51\frac{3}{11} \times 69 = \$932.43\frac{3}{7}$ Ans.
40. $\$80.50 \div 23 = \$3.50;$ $\$3.50 \times 5 = \$17.50;$ $\$17.50 \times 15 = \262.50 Ans.
41. $\$62.37 \div 81 = \$0.77;$ $\$0.77 \times 11 = \$8.47;$ $\$8.47 \times 19 = \160.93 Ans.
43. $\$668.50 \div 191 = \$3.50;$ $\$3.50 \times 11 = \$38.50;$ $\$38.50 \div 5 = \$7.70;$ $\$7.70 \times 449 = \3457.30 Ans.
44. $\$1738 \div 79 = \$22;$ $\$22 \times 4 = \$88;$ $\$88 \div 11 = \$8;$ $\$8 \times 411 = \3288 Ans.
45. $1128\text{ft.} \div 47 = 24;$ $24 \times 4 = 96;$ $96 \div 8 = 12;$ $8 \times 1435 = 11480$ feet, Ans.
46. $116\text{cwt.} \div 29 = 4;$ $4 \times 8 = 32;$ $32 \div 4 = 8;$ $8 \times 47 = 376$ cwt. Ans.
47. $376 \div 47 = 8;$ $8 \times 4 = 32;$ $32 \div 8 = 4;$ $4 \times 29 = 116$ cwt. Ans.

48. $\$8 \div 10 = \frac{8}{10} ; \frac{8}{10} \times \frac{1}{4} = \frac{8}{40} ; \frac{8}{40} \times \frac{7}{5} = \frac{56}{200} = \frac{7}{25} = \0.28
\$0.28 Ans.
49. $\$414 \div 207 = \$2 ; \$2 \times 10 = \$20 ; \$20 \div 5 = \$4 ;$
 $\$4 \times 59 = \236 Ans.

MISCELLANEOUS QUESTIONS BY ANALYSIS.

1. (p. 179.) $\$896.50 \div 11 = \$81.50 ; \$81.50 \times 10 = \815 Ans.
2. $\$17\frac{3}{11} \div 3 = \$5\frac{2}{3} ; \$5\frac{2}{3} \times 37 = \$213.03\frac{1}{3}$ Ans.
3. $\$3687 \div 8 = \$460.87\frac{1}{2} ; \$460.87\frac{1}{2} \times 7 = \$3226.12\frac{1}{2}$ Ans.
4. $17\frac{7}{12} = \frac{211}{12} ; 187\frac{3}{8} = \frac{1499}{8} ; \frac{1499}{8} \div \frac{211}{12} = \frac{1499}{8} \times \frac{12}{211} = \frac{4497}{222} ; \frac{4497}{222} \times \frac{5}{7} = \frac{22485}{1544} = \$7.61\frac{253}{1477}$ Ans.
5. $\$13\frac{7}{8} = \frac{111}{8} ; \frac{111}{8} \times \frac{1}{5} = \frac{111}{40} = \$30.52\frac{1}{2}$ Ans.
6. $\$37\frac{3}{11} = \frac{410}{11} ; \frac{410}{11} \div 100 = \frac{4}{10} ; \frac{4}{10} \times \frac{1}{4} = \frac{1}{10} = \$0.21\frac{7}{10}$ Ans.
7. $\$0.12 \times \frac{1}{4} = \frac{12}{40} ; 48\frac{7}{13} = \frac{631}{13} ; \frac{12}{40} \times \frac{631}{13} = \frac{20823}{13} = \$16.01\frac{1}{13}$ Ans.
8. $\$3\frac{2}{7} = \frac{23}{7} ; 6\frac{2}{5} = \frac{33}{5} ; \frac{23}{7} \times \frac{2}{5} = \frac{207}{35} ; \frac{207}{35} \times \frac{33}{5} = \frac{6831}{140} = \$48\frac{11}{140}$ Ans.
9. $\$236 \div 11\frac{4}{5} = \frac{236}{11\frac{4}{5}} \times \frac{5}{59} = \$20 ; \$20 \times 20\frac{7}{10} = \414 [Ans.]
10. $97\frac{4}{7} \div 3 = 32\frac{4}{7} ; 1073\frac{2}{7} \div 32\frac{4}{7} = \frac{7513}{7} \times \frac{21}{688} = 33$ bales, Ans.
11. $\$48\frac{11}{140} \div 6\frac{2}{5} = \frac{6831}{140} \div \frac{33}{5} = \frac{6831}{140} \times \frac{5}{33} = \frac{207}{28} ; \frac{207}{28} \times \frac{4}{9} = \frac{23}{7} = \$3.28\frac{4}{7}$ Ans.

$$12. 34 \div 3\frac{3}{5} = 34 \times \frac{5}{18} = \frac{170}{18}; \quad \frac{170}{18} \times 7\frac{1}{2} = \frac{170}{18} \times \frac{15}{2} \\ = 125 = \$ 6.90 \text{ Ans.}$$

$$13. \$ 63 \div 2\frac{1}{4} = 63 \div \frac{9}{4} = 63 \times \frac{4}{9} = \frac{252}{9}; \quad \frac{252}{9} \times \frac{148}{9} = \\ 1252 = \$ 381\frac{1}{9} \text{ Ans.}$$

$$14. \$ 17\frac{1}{11} \div (3 \times 3) = \$ 17\frac{1}{11} \div 9 = \$ 1\frac{8}{11}; \quad \$ 1\frac{8}{11} \times 4 = \\ \$ 7\frac{7}{11} \text{ Ans.}$$

$$15. \$ 31\frac{1}{7} = 221; \quad 2\frac{1}{6} = \frac{13}{6}; \quad 221 \div \frac{13}{6} = \frac{221}{7} \times \frac{6}{13} = \frac{12}{7}; \\ 689\frac{1}{3} = 210; \quad \frac{12}{7} \times \frac{8961}{13} = \frac{10368}{7} = \$ 7680\frac{8}{7} \text{ Ans.}$$

$$16. \$ 63 \div 6\frac{3}{5} = \frac{63}{1} \div \frac{33}{5} = \frac{63}{1} \times \frac{5}{33} = \frac{105}{11}; \quad \frac{105}{11} \times \frac{18}{1} = \\ 189 = \$ 170.10 \text{ Ans.}$$

$$17. \$ 243\frac{1}{11} = 214\frac{1}{11}; \quad \frac{214}{1} \div \frac{1337}{1} = \frac{214}{1} \times \frac{11}{1337} = \frac{235}{1337}; \\ \$ 1000 \times \frac{235}{1337} = 394\frac{128}{1337} \text{ barrels, Ans.}$$

$$18. 83\frac{8}{16} = 13\frac{17}{16}; \quad \$ 7888.30 \div 13\frac{17}{16} = \frac{7888.30}{1} \times \frac{16}{217} = \\ \$ 94.40; \quad \$ 94.40 \times 7 = \$ 660.80 \text{ Ans.}$$

$$19. 132\text{£. } 12\text{s.} = 2652\text{s.}; \quad 7\frac{1}{5} = \frac{68}{5}; \quad 12\frac{1}{5} = \frac{11}{5}; \quad 2652\text{s.} \div \\ \frac{68}{5} = \frac{2652}{1} \times \frac{5}{68} = 351\text{s.}; \quad \frac{351}{1} \times \frac{115}{9} = 4485\text{s.} = \\ 224\text{£. } 5\text{s. Ans.}$$

$$20. 17\frac{2}{3} = 5\frac{2}{3}; \quad 89\frac{1}{3} = 2\frac{2}{3}; \quad \$ 25.44 \div 5\frac{2}{3} = \frac{25.44}{1} \times \frac{3}{15} = \\ \$ 144; \quad \frac{144}{1} \times \frac{268}{3} = \$ 128.64 \text{ Ans.}$$

$$21. 7\frac{7}{12} = \frac{91}{12}; 19\frac{1}{2} = \frac{23}{2}; \$7.28 \div \frac{91}{12} = \frac{728}{1} \times \frac{12}{91} = \\ \$0.96; \$0.96 \times \frac{23}{2} = \$19.12 \text{ Ans.}$$

$$22. 49\frac{1}{4} = \frac{197}{4}; 37\frac{1}{4} = \frac{149}{4}; \$4355.52 \div \frac{197}{4} = \frac{4355.52}{1} \times \frac{4}{197} = \\ \frac{1248}{349} = \$87.36; \frac{87.36}{1} \times \frac{264}{7} = \$3294.72 \text{ Ans.}$$

$$23. \frac{1}{4} \times \frac{1}{5} = \frac{1}{20}; \$300,000 \div 3 = \$100,000; \$100,000 \times \\ 20 = \$2,000,000 \text{ Ans.}$$

$$24. 7\frac{8}{9} = \frac{65}{9}; 19\frac{1}{4} = \frac{77}{4}; \$135.80 \div \frac{65}{9} = \frac{13580}{1} \times \frac{9}{65} = \\ \frac{140}{455} = \$18.20; \frac{18.20}{1} \times \frac{79}{4} = \$359.45 \text{ Ans.}$$

$$25. 6 \text{ cords } 76\text{ft.} = 576\text{ft.}; \frac{7}{4} - \frac{3}{4} = \frac{4}{4}; 4\frac{1}{5} = \frac{24}{5}; 576\text{ft.} \times \frac{4}{4} \\ = \frac{24}{5} \times \frac{4}{4} = \frac{96}{5}; \frac{96}{5} \times \frac{24}{5} = \frac{2304}{25} = \$23.14\frac{1}{25} \text{ Ans.}$$

$$26. 30\text{rd.} \times 30\text{rd.} = 900; 18 + 82 = 100; 900 - 100 = 800; \\ \frac{800}{800} = \frac{1}{2} \text{ Ans.}$$

$$27. 7\text{T. } 12\text{cwt. } 3\text{qr. } 18\text{lb.} - 3\text{T. } 18\text{cwt. } 1\text{qr. } 20\text{lb.} = 3\text{T. } 14\text{cwt.} \\ 1\text{qr. } 26\text{lb.} = 8342\text{lb.}; \frac{8342}{1} \times \frac{3}{5} = \frac{25026}{5}; \frac{53}{7} = \frac{38}{7}; \\ \frac{25026}{5} \times \frac{38}{7} = \frac{950988}{35} = \$271.71\frac{3}{5} \text{ Ans.}$$

$$28. \$68.50 \times 37 = \$2534.50; \$2534.50 \times \frac{1}{4} = \$1900.87\frac{1}{2} \\ = \text{value of coffee}; \$2534.50 - \$1900.87\frac{1}{2} = \$633.62\frac{1}{2} \text{ Ans.}$$

$$29. \frac{1}{4} - \frac{3}{4} = \frac{1}{4}; \$7896 \times \frac{1}{4} = \$1974; \$1974 \times 2 = \$3948 \\ \text{Ans.}$$

$$30. \frac{1}{3} - \frac{1}{3} = \frac{0}{3}; \frac{0}{3} \times \frac{5}{3} = \frac{0}{9}; \frac{0}{3} - \frac{45}{169} = \frac{0}{169}; \$88 \\ \times \frac{0}{169} = \frac{8800}{169} \times \frac{0}{169} = \frac{0}{169} = \$37.49\frac{19}{169} \text{ Ans.}$$

$$31. \frac{1}{4} - \frac{3}{4} = \frac{1}{4}; \frac{1}{4} \times \frac{2}{3} = \frac{1}{6}; \frac{1}{4} - \frac{1}{6} = \frac{1}{12}; \frac{1}{12} \times \frac{3}{4} = \frac{1}{16} = \\ \frac{2}{32} = \frac{1}{16} \text{ Ans.}$$

$\$750; \frac{5}{6} = \$750 \times 16 = \$12,000 \text{ Ans.}$

DECIMAL FRACTIONS.

NOTATION OF DECIMAL FRACTIONS.

| (ART. 181, p. 183.) | 7. | 75.9 |
|---------------------|-----|--------------------------------------|
| 1. 307.25 | 8. | 2000.002 |
| 2. 47.7 | 9. | 18.018 |
| 3. 18.05 | 10. | 505.001006 |
| 4. 29.003 | 11. | 300.0000042 |
| 5. .0049 | 12. | 2500.000000037 or 2500.0000000037 |
| 6. 8.000008 | | |

ADDITION OF DECIMALS.

(ART. 183, p. 184.)

| (2.) | (3.) | (4.) |
|-------------------|---------------|---------------|
| 171.61111 | .16711 | 151.01 |
| 16.7101 | 1.766 | 611111.01 |
| .00007 | 76111.1 | 16.5 |
| 71.0006 | 167.1 | 6.7 |
| 1.167895 | .000007 | 46.1 |
| <u>260.489775</u> | <u>1476.1</u> | <u>.67896</u> |
| | 77756.233117 | 611331.99896 |

| (5.) | (6.) | (7.) |
|---------------------|-------------------|--------------------|
| 56000.014 | 49.0105 | 3.0018 |
| 19.19 | 89.107 | 1005.023043 |
| 57.0048 | .000127 | 87.107 |
| 23005.4 | .0048 | .0049 |
| .000014 | <u>138.122427</u> | <u>47000.00309</u> |
| <u>79081.608814</u> | | 48095.139833 |

SUBTRACTION OF DECIMALS.

(ART. 184, p. 185.)

| (5.) | (6.) | (7.) | (8.) | (9.) |
|------------------|----------------|----------------|----------------|---------------|
| 81.35 | 1. | 100. | 87.1 | 100. |
| 11.678956 | .876543 | 99.111176 | 5.6789 | .001 |
| <u>69.671044</u> | <u>.123457</u> | <u>.888824</u> | <u>81.4211</u> | <u>99.999</u> |

| (10.) | (11.) | (12.) | (13.) | (14.) |
|---------------|-----------------|-----------------------|-------------|--------------|
| 73. | 365. | 357000. | .875 | .3125 |
| .073 | .0047 | 28.0004009 | .4 | .125 |
| <u>72.927</u> | <u>364.9953</u> | <u>356971.9995991</u> | <u>.475</u> | <u>.1875</u> |

| (15.) | (16.) | (17.) | (18.) | (19.) |
|-------|-------|--------|-------|-------|
| .95 | 3.7 | 8.125 | 9.375 | .666 |
| .44 | 1.8 | 2.6875 | 1.5 | .041 |
| .51 | 1.9 | 5.4375 | 7.875 | .625 |

MULTIPLICATION OF DECIMALS.

| | | | |
|---------------------|-----------|----|-----------|
| (AET. 185, p. 187.) | | 6. | 1137. |
| 3. | .12649 | 7. | 2.20947 |
| 4. | 18.58922 | 8. | .00046967 |
| 5. | .00000114 | 9. | 22.09 |

| (10.) | (11.) | (12.) | (13.) |
|-------------------|----------------------|-----------------|------------------|
| .087 | 107000.0015 | .0097 | .096 |
| .000015 | .0107 | 400.67 | .00096 |
| <u>.000001305</u> | <u>7490000105</u> | <u>679</u> | <u>576</u> |
| | <u>1070000015</u> | <u>582</u> | <u>864</u> |
| | <u>1144.90001605</u> | <u>388</u> | <u>.00009216</u> |
| | | <u>3.886499</u> | |

| (14.) | (15.) | (16.) | (17.) |
|-----------|------------|------------------|--------------------|
| 1000000. | 100. | .101 | 1050.0007 |
| .000001 | .0014 | .10101 | .00305 |
| <u>1.</u> | <u>400</u> | <u>101</u> | <u>52500035</u> |
| | <u>100</u> | <u>101</u> | <u>31500021</u> |
| | <u>.14</u> | <u>101</u> | <u>3.202502135</u> |
| | | <u>.01020201</u> | |

| (18.) | (19.) | (20.) |
|-----------------|--------------------|----------------|
| 2000000. | 400.004 | \$ 1.125 |
| .7 | 30.03 | 46. |
| <u>1400000.</u> | <u>1200012</u> | <u>6750</u> |
| | <u>1200012</u> | <u>4500</u> |
| | <u>12012.12012</u> | <u>* 51.75</u> |

| (21.) | (22.) | (23.) |
|----------------------|-------------|--------------|
| Tons 17.125 | \$.125 | 375.25 |
| \$ 18.875 | 18. | \$ 0.62 |
| <u>85625</u> | <u>1000</u> | <u>75050</u> |
| 119875 | 125 | 225150 |
| 137000 | \$ 2.250 | \$ 232.6550 |
| 137000 | | |
| 17125 | | |
| <u>\$ 323.234375</u> | | |

DIVISION OF DECIMALS.

| | | |
|-----------------------------|-----|-----------|
| 3. (Art. 186, p. 189.) .375 | 7. | .0144 |
| 4. 2.069 | 8. | 9.784 |
| 5. 1930.51 | 9. | 125.36 |
| 6. .069255 | 10. | 148.939 + |

$$(11.) \quad (12.) \quad (13.) \\ 1.2) 172.8(144. \quad .12) 1728(14400. \quad .12) 1728(1.44$$

$$(14.) \quad (15.) \quad (16.) \\ 12) 1.728(.144 \quad 1.2) 17.28(14.4 \quad .0012) 1728(1440000.$$

$$(17.) \quad (18.) \quad (19.) \\ 12) 0.001728(.000144 \quad 9.7) 147.828(15.24 \quad .328) 678767(2.069 +$$

$$(20.) \quad (21.) \\ 5.428) 75.16(13.846 + \quad 31.076) 4.01020304(.129045 +$$

REDUCTION OF DECIMALS.

(Art. 187, p. 190.)

| (2.) | (3.) | (4.) |
|---------|----------|------------|
| 4) 3.00 | 8) 7.000 | 16) 7.0000 |
| .75 | .875 | .4375 |

| (5.) | (6.) | (7.) |
|--------------|--------------|--------------|
| 11) 4.000000 | 12) 5.000000 | 17) 4.000000 |
| .363636 + | .416666 + | .235294 + |

(ART. 188, p. 191.)

$$\begin{array}{r} (2.) \\ 12 \bigg| 6.0 \\ 20 \bigg| 15.5 \\ \hline .775 \end{array}$$

$$\begin{array}{r} (3.) \\ 28 \bigg| 14.0 \\ 4 \bigg| 2.500 \\ 20 \bigg| 5.6250 \\ \hline .28125 \end{array}$$

$$\begin{array}{r} (4.) \\ 28 \bigg| 21.00 \\ 4 \bigg| 3.7500 \\ \hline .9375 \end{array}$$

$$\begin{array}{r} (5.) \\ 40 \bigg| 8.0 \\ 8 \bigg| 6.200 \\ \hline .775 \end{array}$$

$$\begin{array}{r} (6.) \\ 144 \bigg| 72.0 \\ 272 \frac{1}{4} \bigg| 167.5 \\ 40 \bigg| 19.615243 \\ 4 \bigg| 3.490381 \\ \hline .872595 + \end{array}$$

(ART. 189, p. 192.)

$$\begin{array}{cccc} (1.) & (2.) & (3.) & (4.) \\ .628125 & .778125 & .75 & .965625 \\ 20 & 20 & 5 & 8 \\ \hline 12.562500 & 15.562500 & 3.75 & 7.725000 \\ 12 & 4 & 4 & 40 \\ \hline 6.750000 & 2.250000 & 3.00 & 29.000000 \\ 4 & 28 & Ans. 3qr. 3pa. & Ans. 7fur. 29rd. \\ \hline 3.000000 & 7.000000 & & \end{array}$$

Ans. 12s. 6 $\frac{3}{4}$ d. Ans. 15cwt. 2qr. 7lb.

$$\begin{array}{ccc} (5.) & (6.) & (7.) \\ .94375 & .815625 & .5555 \\ 4 & 12 & 12 \\ \hline 3.77500 & 9.787500 & 6.6660 \\ 40 & 20 & 8 \\ \hline 31.00000 & 15.750000 & 5.3280 \\ \hline Ans. 3R. 31p. & 24 & 3 \\ & 18.000000 & .9840 \\ & Ans. 9oz. 15dwt. 18gr. & 20 \\ & & \hline & & 19.6800 \\ & & Ans. 6\frac{3}{5} 53 0\frac{9}{12} 19\frac{1}{2} gr. & & \end{array}$$

EXERCISES IN DECIMALS.

| (1.) | (2.) |
|---|--|
| $\begin{array}{r} 28 \\ \hline 14.0 \\ -3.500 \\ \hline 15.875 \\ -9.50 \\ \hline 793750 \\ -142875 \\ \hline \$150.81,250 \end{array}$ | $\begin{array}{r} 28 \\ \hline 7.00 \\ -4 \\ \hline 20 \\ -18.3125 \\ \hline 17.915625 \\ -\$53.80 \\ \hline 1433250000 \\ -53746875 \\ \hline \$89578125 \\ -\$963.86,0625 \end{array}$ |

3. $16 \div 40 = .4$; $3 + .4 = 3.4$; $3.4 \div 4 = .85$; $37 + .85 = 37.85$; $37.85 \times \$75.16 = \2844.80 , 6 Ans.
4. $2 \div 4 = .5$; $3 + .5 = 3.5$; $3.5 \div 4 = .875$; $15 + .875 = 15.875$; $15.875 \times \$3.75 = \59.53 , 125 Ans.
5. $15.375 \times \$4.625 = \$71.10,9375$ Ans.
6. $36 \div 40 = .9$; $6 + .9 = 6.9$; $6.9 \div 8 = .8625$; $17 + .8625 = 17.8625$; $17.8625 \times \$3765.60 = \67263.03 Ans.
7. $21 \div 63 = .333 +$; $27 + .333 + = 27.333 +$; $27.333 + \times \$15.375 = \$420.24,4875 +$ Ans.
8. $9 \div 12 = .75$; $18 + .75 = 18.75$; $6 \div 12 = .5$; $4 + .5 = 4.5$; $3 + 12 = .25$; $7 + .25 = 7.25$; $18.75 \times 4.5 \times 7.25 = 611.71875$ feet; $.71875 \times 1728 = 1242$ inches. Ans. 611ft. 1242in.
9. $6 \div 12 = .5$; $12 + .5 = 12.5$; $9 \div 12 = .75$; $2 + .75 = 2.75$; $12.5 \times 2.75 = 34.375$ feet; $.375 \times 144 = 54$ inches. Ans. 34ft. 54in.
10. $1 \div 2 = .5$; $3 + .5 = 3.5$; $3.5 \div 4 = .875$; $25 + .875 = 25.875$; $25.875 \times \$3.75 = \$9.70,3125$ Ans.
11. $30 \div 40 = .75$; $3 + .75 = 3.75$; $3.75 \div 4 = .9375$; $144 + .9375 = 144.9375$; $144.9375 \times \$97.625 = \$14149.52,34375$ Ans.
12. $21 \div 28 = .75$; $.75 \div 4 = .1875$; $18 + .1875 = 18.1875$; $18.1875 \div 20 = .909375$; $3 + .909375 =$

$$3.909375 ; \quad 3.909375 \times \$9.375 = \$36.65,0390625 ; \\ \$36.65,0390625 - \$20.25 = \$16.40 + \text{Ans.}$$

13. $\$5.50 \div 7 = \$0.78\frac{1}{4}$; $\$0.78\frac{1}{4} \times 8 = \$6.28\frac{1}{4}$; $\$6.28\frac{1}{4} \times 7.75 = \$48.71,42\frac{1}{4}$ Ans.
 14. $\$12\frac{1}{2} = \12.625 ; $4\frac{1}{4} = 4.75$; $\$12.625 \div 4.75 = 2.657894 +$; $2.657894 + \times 17.375 = \$46.18,09 +$ Ans.
-

REDUCTION OF CURRENCIES.

2. (ART. 191, p. 194.) $144\text{£. }7\text{s. }6\text{d.} = 144.375\text{£.} ;$
 $144.375\text{£.} \div \frac{3}{10}\text{£.} = \481.25 Ans. [Ans.]
 3. $74\text{£. }1\text{s. }6\text{d.} = 74.075\text{£.} ;$ $74.075\text{£.} \div \frac{2}{3}\text{£.} = \$185.18\frac{1}{4}$,
 4. $129\text{£.} \div \frac{3}{8}\text{£.} = \344 Ans.
 5. $144\text{£. }6\text{s. }3\text{d. }2\text{qr.} = 144.31458 + \text{£.} ;$ $144.31458 + \text{£.} \div \frac{1}{2}\text{£.} = \$288.62,9$ Ans.
 6. $84\text{£.} \div \frac{7}{30}\text{£.} = \360 Ans.
 7. $144\text{£. }4\text{s.} = 144.20\text{£.} ;$ $144.20\text{£.} \div \frac{1}{4}\text{£.} = \576.80 , Ans.
 8. $257\text{£. }8\text{s. }6\text{d.} = 257.425\text{£.} ;$ $257.425\text{£.} \div \frac{25}{121}\text{£.} = \$1245.93,7$ Ans.
2. (ART. 192, p. 195.) $\$481.25 \times \frac{3}{10} = 144.375\text{£.} = 144\text{£. }7\text{s. }6\text{d.}$ Ans.
 3. $\$185.18\frac{1}{4} \times \frac{2}{3} = 74.075\text{£.} = 74\text{£. }1\text{s. }6\text{d.}$ Ans.
 4. $\$344 \times \frac{3}{8} = 129\text{£.}$ Ans.
 5. $\$288 \times \frac{1}{2} = 144\text{£.}$ Ans.
 6. $\$360 \times \frac{7}{30} = 84\text{£.}$ Ans.
 7. $\$576.50 \times \frac{1}{4} = 144.125\text{£.} = 144\text{£. }2\text{s. }6\text{d.}$ Ans.
 8. $\$1245.93,7 \times \frac{25}{121} = 257.425\text{£.} = 257\text{£. }8\text{s. }6\text{d.}$ Ans.
-

PERCENTAGE.

| | | | |
|------------------------|-------------|----|----------------|
| 2. (ART. 194, p. 197.) | $\$6.50$ | 5. | 57.375 tons. |
| 3. | $\$39.45$ | 6. | $\$490$ |
| 4. | $\$51.38,9$ | 7. | $\$15.12$ |

8. 26.415 yards. | 10. 29.44 yards.
 \$ 877.50 | 11. \$ 8500
 12. $\$ 100 \times 25 = \$ 2500$; $\$ 2500 \times .12 = \$ 300$ Ans.
 13. $\$ 25 \times 1728 = \$ 43200$; $\$ 43200 \times .15 = \$ 6480$ Ans.
 14. $5000 \times \$ 1.25 = \$ 6250$; $\$ 5000 \times .25 = 1250$; $5000 - 1250 = 3750$; $3750 \times \$ 2 = \$ 7500$; $\$ 7500 - \$ 6250 = \$ 1250$ Ans.
 15. $\$ 8000 \times .19 = \$ 1520$; $\$ 8000 - \$ 1520 = \$ 6480$;
 $\$ 6480 \times .37 = \$ 2397.60$; $\$ 6480.00 - \$ 2397.60 = \$ 4082.40$;
 $\$ 4082.40 - \$ 2000 = \$ 2082.40$ Ans.
 16. $\$ 100 \times .15 = \$ 15$; $\$ 100 - \$ 15 = \$ 85$; $\$ 85 \times 17 = \$ 1445$; $\$ 100 + \$ 15 = \$ 115$; $\$ 115 \times 17 = \$ 1955$; $\$ 1955 - \$ 1445 = \$ 510$ Ans.

(17.)

$$\begin{array}{rcl} 1\frac{1}{4} = 1.75 & & 12635)80000(6\text{yd.} \\ 1.75 \times .95 = 1.6625 & & \overline{75810} \\ 10 \div 1.6625 = 6\frac{2}{3} = \frac{20}{3} & & \overline{4190} \\ \frac{20}{3} \times \frac{100}{95} = \frac{2000}{285} & & \overline{4} \\ & & 12635)16760(1\text{lqr.} \\ & & \overline{12635} \\ & & \overline{4125} \\ & & \overline{4} \\ & & 12635)16500(1\frac{773}{2527}\text{na.} \\ & & \overline{12635} \\ & & \overline{3865} \\ \text{Ans. } 6\text{yd. } 1\frac{773}{2527}\text{na.} & & \end{array}$$

SIMPLE INTEREST.

| (Art. 197, p. 200.) | | | |
|---------------------|--------------------------|-----|--------------------------|
| 2. | \$ 0.08, 1 | 8. | \$ 0.25, 0 $\frac{1}{2}$ |
| 3. | \$ 0.10, 7 | 9. | \$ 0.02, 0 $\frac{1}{2}$ |
| 4. | \$ 0.22, 3 $\frac{1}{2}$ | 10. | \$ 1.02, 0 $\frac{1}{2}$ |
| 5. | \$ 0.12, 8 $\frac{1}{2}$ | 11. | \$ 1.31, 9 $\frac{1}{2}$ |
| 6. | \$ 0.42, 2 $\frac{1}{2}$ | 12. | \$ 1.20, 0 $\frac{1}{2}$ |
| 7. | \$ 0.01, 9 $\frac{1}{2}$ | 13. | \$ 2.11, 5 $\frac{1}{2}$ |

(ART. 198, p. 201.)

| | | | |
|-----|--------------|-----|--------------|
| 2. | \$ 11.82 | 13. | \$ 1.24,8 |
| 3. | \$ 311.04 | 14. | \$ 0.20,5 |
| 4. | \$ 8.28 | 15. | \$ 50.01,6 |
| 5. | \$ 155.52 | 16. | \$ 0.03,1 |
| 6. | \$ 1.68,7 | 17. | \$ 55.60,7 |
| 7. | \$ 17.72,2 | 18. | \$ 149.77,6 |
| 8. | \$ 8.25,8 | 19. | \$ 7.20,5 |
| 9. | \$ 90.83,5 | 20. | \$ 1.05,7 |
| 10. | \$ 1110.23,4 | 21. | \$ 8.79,7 |
| 11. | \$ 88.39,9 | 22. | \$ 7.23 |
| 12. | \$ 122.71,5 | 23. | \$ 1661.37,6 |

| | | | |
|------------------------|-------------|-----|------------|
| 1. (ART. 199, p. 203.) | \$ 10.08 | 9. | \$ 14.15,1 |
| 2. | \$ 97.18 | 10. | \$ 33.97,9 |
| 3. | \$ 231.29,9 | 11. | \$ 16.45,0 |
| 4. | \$ 78.41,4 | 12. | \$ 13.91 |
| 5. | \$ 446.92,9 | 13. | \$ 209.82 |
| 6. | \$ 0.84,9 | 14. | \$ 1183.18 |
| 7. | \$ 430.36 | 15. | \$ 21.03,7 |
| 8. | \$ 137.92,2 | 16. | \$ 388.94 |

(ART. 200, p. 204.)

| | | | |
|----|------------|-----|--------------|
| 2. | \$ 745.50 | 7. | \$ 2163.19,9 |
| 3. | \$ 207.27 | 8. | \$ 274.77,5 |
| 4. | \$ 19.71,3 | 9. | \$ 131.99 |
| 5. | \$ 61.75,4 | 10. | \$ 253.11,9 |
| 6. | \$ 1.86,8 | 11. | \$ 95.02,8 |
| | | 12. | \$ 1904.12,1 |

(2.) (ART. 201, p. 205.)

26£. 10s. = 26.50£.

Interest of 1£. = .14

$$\begin{array}{r}
 10600 \\
 2650 \\
 \hline
 6)3.7100 \\
 \quad\quad\quad 6183\frac{1}{2} \\
 \hline
 \quad\quad\quad 3.0916\frac{3}{4}
 \end{array}$$

(Carried up.)

(Brought up.)

$$\begin{array}{r}
 3.0916\frac{3}{4} \\
 \quad\quad\quad 20 \\
 \hline
 \quad\quad\quad 1.8333\frac{3}{4} \\
 \quad\quad\quad \quad\quad\quad 12 \\
 \hline
 \quad\quad\quad 10.0000
 \end{array}$$

3£. 1s. 10d. Ans.

(3.)

$$\begin{array}{rcl} 42\text{£. } 18\text{s.} & = & 42.90\text{£.} \\ \text{Interest of } 1\text{£.} & = & \underline{.109\frac{1}{2}} \\ & & 38610 \\ & & 4290 \\ & & \underline{715} \\ & & 4.68325 \\ & & \underline{20} \\ & & 13.66500 \\ & & \underline{12} \\ & & 7.98 \\ & & \underline{4} \\ & & 3.92 \end{array}$$

4£. 13s. 7½d. Ans.

(4.)

$$\begin{array}{rcl} 94\text{£. } 12\text{s. } 6\text{d.} & = & 94.625\text{£.} \\ \text{Interest of } 1\text{£.} & = & \underline{.271\frac{1}{2}} \\ & & 94625 \\ & & 662375 \\ & & 189250 \\ & & \underline{15770} \\ & & \frac{2}{3} = \frac{1}{3}) 25.659145 \\ & & 8.553048 \\ & & \underline{34.212193} \\ & & 20 \\ & & \underline{4.243960} \\ & & 12 \\ & & \underline{3.70528} \end{array}$$

34£. 4s. 2½d. Ans.

(5.)

$$\begin{array}{rcl} 110\text{£. } 7\text{s. } 6\text{d.} & = & 110.375\text{£.} \\ \text{Interest of } 1\text{£.} & = & \underline{.415} \\ & & 551875 \\ & & 110375 \\ & & \underline{441500} \\ & & 6) 45.805623 \\ & & 7.634270\frac{1}{2} \\ \text{Interest} & = & \underline{38.171352\frac{1}{2}} \end{array}$$

(Carried up.) 148£. 10s. 11d. Ans.

(Brought up.)

$$\begin{array}{rcl} & & \underline{110.375} \\ & & \underline{148.546} \\ & & 20 \\ & & \underline{10.920} \\ & & 12 \\ & & \underline{11.040} \end{array}$$

MISCELLANEOUS EXERCISES IN INTEREST.

(PAGE 206.)

NOTE. When the required interest is more or less than 6 per cent., we may first find the interest at 6 per cent., by the foregoing Rules, then divide this interest by 6, and the quotient will be the interest of the required sum at 1 per cent. Then, if we multiply the 1 per cent. by the required per cent., we obtain the answer. Or the pupil, if he please, can perform the following questions by Article 200.

KEY TO

| (1.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1842 | 6 | 9 |
| 1840 | 8 | 25 |
| | 1 | 9 |
| | 9 | 14 |

| | | |
|---------------------|---------------------|--------------------|
| \$ 172.50 | 169.75 | \$ 17.18 |
| .107 $\frac{1}{3}$ | .144 $\frac{1}{3}$ | .245 $\frac{1}{3}$ |
| <u>120750</u> | <u>67900</u> | <u>8590</u> |
| 17250 | 67900 | 6872 |
| 5750 | 16975 | 3436 |
| <u> </u> | <u>2829</u> | <u>572</u> |
| <u>\$ 18.51,500</u> | <u>\$ 24.47,229</u> | <u>\$ 4.21,482</u> |

| (4.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1841 | 11 | 11 |
| 1839 | 3 | 7 |
| | 2 | 8 |
| | 8 | 4 |

| | | |
|---------------------|---------------------|----------------------|
| \$ 67.07 | \$ 117.75 | \$ 847.15 |
| .160 $\frac{2}{3}$ | .177 | .195 $\frac{1}{3}$ |
| <u>402420</u> | <u>82425</u> | <u>423575</u> |
| 6707 | 82425 | 762435 |
| 4471 | 11775 | 84715 |
| <u> </u> | <u> </u> | <u>28238</u> |
| <u>\$ 10.77,591</u> | <u>\$ 20.84,175</u> | <u>\$ 165.47,663</u> |

| (7.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1842 | 1 | 11 |
| 1841 | 2 | 1 |
| | 11 | 10 |

| | | |
|--------------------|----------------------|--------------------|
| \$ 7.18 | \$ 976.18 | \$ 144 |
| .056 $\frac{2}{3}$ | .209 $\frac{1}{3}$ | .157 $\frac{1}{3}$ |
| <u>4308</u> | <u>878562</u> | <u>1008</u> |
| 3590 | 195236 | 720 |
| 478 | 32539 | 14448 |
| <u> </u> | <u> </u> | <u>22.656</u> |
| <u>\$ 40,686</u> | <u>\$ 204.34,701</u> | <u>144</u> |

| (2.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1841 | 4 | 5 |
| 1838 | 11 | 10 |
| | 2 | 4 |
| | 4 | 25 |

| (5.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1841 | 11 | 19 |
| 1839 | 0 | 7 |
| | 2 | 11 |
| | 11 | 12 |

| | | |
|---------------------|---------------------|----------------------|
| \$ 67.07 | \$ 117.75 | \$ 847.15 |
| .160 $\frac{2}{3}$ | .177 | .195 $\frac{1}{3}$ |
| <u>402420</u> | <u>82425</u> | <u>423575</u> |
| 6707 | 82425 | 762435 |
| 4471 | 11775 | 84715 |
| <u> </u> | <u> </u> | <u>28238</u> |
| <u>\$ 10.77,591</u> | <u>\$ 20.84,175</u> | <u>\$ 165.47,663</u> |

| (3.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1841 | 8 | 1 |
| 1837 | 6 | 29 |
| | 4 | 1 |
| | 1 | 2 |

| (6.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1843 | 0 | 11 |
| 1839 | 9 | 9 |
| | 3 | 3 |
| | 3 | 2 |

| (7.) | | |
|------|-----|----|
| y. | mo. | d. |
| 1842 | 2 | 9 |
| 1839 | 6 | 25 |
| | 2 | 7 |
| | 7 | 14 |

| | | |
|--------------------|----------------------|--------------------|
| \$ 7.18 | \$ 976.18 | \$ 144 |
| .056 $\frac{2}{3}$ | .209 $\frac{1}{3}$ | .157 $\frac{1}{3}$ |
| <u>4308</u> | <u>878562</u> | <u>1008</u> |
| 3590 | 195236 | 720 |
| 478 | 32539 | 14448 |
| <u> </u> | <u> </u> | <u>22.656</u> |
| <u>\$ 40,686</u> | <u>\$ 204.34,701</u> | <u>144</u> |

\$ 166.65,6

(10.)

| y. | mo. | d. | | y. | mo. | d. | |
|----------------------|-----|----|----|---------------------|-----|----|--------------------|
| 1842 | 0 | 1 | | 1842 | 0 | 1 | |
| 1840 | 0 | 19 | | 1841 | 3 | 23 | |
| | 1 | 11 | 12 | | 8 | 8 | |
| | | | | | | | |
| \$ 375.83 | | | | \$ 76.19 | | | \$ 68.19 |
| .117 | | | | .041 $\frac{1}{2}$ | | | .061 |
| <u>263081</u> | | | | <u>7619</u> | | | <u>6819</u> |
| 37583 | | | | 30476 | | | 40914 |
| <u>37583</u> | | | | <u>2539</u> | | | |
| <u>43.97,211</u> | | | | <u>3.14,918</u> | | | <u>6)4.15,959</u> |
| <u>375.83</u> | | | | <u>76.19</u> | | | <u>.69,326</u> |
| <u>419.80,211</u> | | | | <u>\$ 79.33,918</u> | | | <u>\$ 4.85,285</u> |
| <u>79.33,918</u> | | | | | | | |
| <u>\$ 499.14,129</u> | | | | | | | |

(11.)

| y. | mo. | d. | |
|--------------------|-----|----|---|
| 1841 | 5 | 11 | |
| 1840 | 5 | 5 | |
| | 1 | 0 | 6 |
| | | | |
| \$ 68.19 | | | |
| .061 | | | |
| <u>6819</u> | | | |
| 40914 | | | |
| <u>6)4.15,959</u> | | | |
| <u>.69,326</u> | | | |
| <u>\$ 4.85,285</u> | | | |

(12.)

| y. | mo. | d. | |
|----------------------|-----|----|----|
| 1842 | 11 | 30 | |
| 1839 | 1 | 17 | |
| | 3 | 10 | 13 |
| | | | |
| \$ 79.15 | | | |
| .232 $\frac{1}{2}$ | | | |
| <u>15830</u> | | | |
| 23745 | | | |
| <u>15830</u> | | | |
| 1319 | | | |
| <u>6)18.37,599</u> | | | |
| 3.06,266 | | | |
| <u>7\frac{1}{2}</u> | | | |
| 21.43,862 | | | |
| 1.53,138 | | | |
| <u>22.96,995</u> | | | |
| 79.15 | | | |
| <u>\$ 102.11,995</u> | | | |

(13.)

| y. | mo. | d. | |
|----------------------|-----|----|----|
| 1841 | 11 | 9 | |
| 1840 | 5 | 19 | |
| | 1 | 5 | 20 |
| | | | |
| \$ 89.96 | | | |
| .088 $\frac{1}{2}$ | | | |
| <u>71968</u> | | | |
| 71968 | | | |
| <u>2998</u> | | | |
| <u>6)7.94,646</u> | | | |
| 1.32,441 | | | |
| <u>8\frac{1}{4}</u> | | | |
| 10.59,528 | | | |
| <u>.33,110</u> | | | |
| <u>10.92,638</u> | | | |
| 89.96 | | | |
| <u>\$ 100.88,638</u> | | | |

(14.)

| y. | mo. | d. | |
|----------------------|-----|----|----|
| 1841 | 6 | 4 | |
| 1839 | 5 | 5 | |
| | 2 | 0 | 29 |
| | | | |
| \$ 325.00 | | | |
| .124 $\frac{1}{2}$ | | | |
| <u>130000</u> | | | |
| 65000 | | | |
| <u>32500</u> | | | |
| <u>27000</u> | | | |
| <u>6)40.57,000</u> | | | |
| 6.76,166 | | | |
| <u>7\frac{1}{4}</u> | | | |
| 47.33,162 | | | |
| <u>1.69,041</u> | | | |
| <u>49.02,203</u> | | | |
| 325. | | | |
| <u>\$ 374.02,203</u> | | | |

KEY TO

(15.)

| y. | mo. | d. |
|------|-----|----|
| 1842 | 9 | 9 |
| 1839 | 11 | 29 |
| | 2 | 9 |
| | 9 | 10 |

\$ 1728

.166 $\frac{1}{2}$ 10368

10368

1728

1152

6) 288.000

48.000

9

432.000

1728.

\$ 2160.000

(16.)

| y. | mo. | d. |
|------|-----|----|
| 1842 | 6 | 4 |
| 1841 | 0 | 29 |
| | 1 | 5 |
| | 5 | 5 |

\$ 976.18

.085 $\frac{1}{2}$ 488090

780944

81348

83.78,878

2\$ 167.57,756

(17.)

| y. | mo. | d. |
|------|-----|----|
| 1843 | 8 | 7 |
| 1839 | 5 | 19 |
| | 4 | 2 |
| | 18 | |

\$ 176.17

.253

52851

88085

352346) 44.57,101

7.42,850

9 $\frac{1}{2}$

66.85,650

5.57,137\$ 72.42,787

(18.)

| y. | mo. | d. |
|------|-----|----|
| 1847 | 7 | 23 |
| 1808 | 11 | 3 |
| | 38 | 8 |
| | 8 | 20 |

\$ 379.78

2.323 $\frac{1}{2}$ 113934

75956

113934

75956

12659

6) 882.35,553

147.05,925

7 $\frac{1}{2}$

1029.41,475

110.29,443

1139.70,918

879.78

\$ 1519.48,918

(19.)

| y. | mo. | d. |
|------|-----|----|
| 1843 | 8 | 25 |
| 1841 | 4 | 7 |
| | 2 | 4 |
| | 18 | |

\$ 175.08

.143

52524

70032

17508

6) 25.03,644

4.17,274

29.20,918

175.08

\$ 204.28,9

(20.)

| y. | mo. | d. |
|------|-----|----|
| 1844 | 8 | 9 |
| 1843 | 11 | 11 |
| | 8 | 28 |

\$ 160

.044 $\frac{1}{2}$ 640

640

106

6) 7.14,6

1.19,1

8.33,7

160

\$ 168.33,7

| (21.) | | |
|-------|-----|----|
| y. | mo. | d. |
| 1843 | 6 | 4 |
| 1841 | 1 | 26 |
| | 2 | 4 |
| | 8 | |

| (22.) | | |
|-------|-----|----|
| y. | mo. | d. |
| 1844 | 6 | 17 |
| 1842 | 2 | 15 |
| | 2 | 4 |
| | 2 | 2 |

| (23.) | | |
|-------|-----|----|
| y. | mo. | d. |
| 1844 | 10 | 9 |
| 1843 | 7 | 17 |
| | 1 | 2 |
| | 22 | |

| | | |
|--------------------|--------------------|--------------------|
| \$ 857.16 | \$ 171.18 | \$ 97.19 |
| .141 $\frac{1}{2}$ | .140 $\frac{1}{2}$ | .073 $\frac{1}{2}$ |
| 85716 | 684720 | 29157 |
| 342864 | 17118 | 68033 |
| 85716 | 5706 | 6479 |
| 28572 | 24.02,226 | 6)7.15,966 |
| 6)121.14,528 | 9 | 1.19,327 |
| 20.19,088 | 6)216.20,034 | \$ 8.35,293 |
| 7 $\frac{1}{2}$ | \$ 36.03,339 | |
| 141.33,616 | | |
| 5.04,772 | | |
| \$ 146.38,388 | | |

| | | |
|--------------------|--------------------|--------------------|
| \$ 857.16 | \$ 171.18 | \$ 97.19 |
| .141 $\frac{1}{2}$ | .140 $\frac{1}{2}$ | .073 $\frac{1}{2}$ |
| 85716 | 684720 | 29157 |
| 342864 | 17118 | 68033 |
| 85716 | 5706 | 6479 |
| 28572 | 24.02,226 | 6)7.15,966 |
| 6)121.14,528 | 9 | 1.19,327 |
| 20.19,088 | 6)216.20,034 | \$ 8.35,293 |
| 7 $\frac{1}{2}$ | \$ 36.03,339 | |
| 141.33,616 | | |
| 5.04,772 | | |
| \$ 146.38,388 | | |

| (24.) | | |
|-------|-----|----|
| y. | mo. | d. |
| 1843 | 9 | 11 |
| 1840 | 11 | 19 |
| | 2 | 9 |
| | 22 | |

| (25.) | | |
|-------|-----|----|
| y. | mo. | d. |
| 1843 | 2 | 9 |
| 1841 | 5 | 7 |
| | 1 | 9 |
| | 2 | 2 |

KEY TO

PARTIAL PAYMENTS.

(ART. 203, p. 208.)

(2.)

| | | |
|--|-------------------|--------------|
| Principal, | | \$ 987.75 |
| Interest for 9 months, 2 days, | | <u>44.77</u> |
| | Amount, | \$ 1032.52 |
| First payment, | | \$ 300.00 |
| Interest for 7 months, 12 days, | | 11.10 |
| Second payment, | | 400.00 |
| Interest for 6 months, 8 days, | | 12.53 |
| Third payment, | | 150.00 |
| Interest for 2 months, 18 days, | | <u>1.95</u> |
| | | \$ 875.58 |
| Balance remains due Dec. 13, 1842, | | \$ 156.94 |

| y. 1842 | mo. 11 | d. 13 | y. 1842 | mo. 11 | d. 13 | y. 1842 | mo. 11 | d. 13 | y. 1842 | mo. 11 | d. 13 |
|---------------------|-----------|----------|-------------------|-----------|----------|--------------------|-----------|----------|------------------|-----------|----------|
| 1842 | 0 | 11 | 1842 | 4 | 1 | 1842 | 5 | 5 | 1842 | 8 | 25 |
| | 11 | 2 | | 7 | 12 | | 6 | 8 | | 2 | 18 |
| | 2 | 0 | | | | | | | | | |
| | <u>9</u> | <u>2</u> | | | | | | | | | |
| \$ 987.75 | | | \$ 300 | | | \$ 400 | | | \$ 150 | | |
| .045 $\frac{1}{2}$ | | | .037 | | | .031 $\frac{1}{2}$ | | | .013 | | |
| <u>493875</u> | | | <u>2100</u> | | | <u>400</u> | | | <u>450</u> | | |
| 395100 | | | 900 | | | 1200 | | | 150 | | |
| 32925 | | | | | | | 133 | | | | |
| <u>\$ 44.77,800</u> | | | <u>\$ 11.10,0</u> | | | <u>\$ 12.53,3</u> | | | <u>\$ 1.95,0</u> | | |

(3.)

| | | |
|--|-------------------|--------------|
| Principal, | | \$ 800.00 |
| Interest for 10 months, 27 days, | | <u>43.60</u> |
| | Amount, | \$ 843.60 |
| First payment, | | \$ 144.00 |
| Interest for 9 months, 21 days, | | 6.98 |
| Second payment, | | 90.00 |
| Interest for 7 months, | | <u>3.15</u> |
| Amounts carried forward, | \$ 244.13 | \$ 843.60 |

| | | | |
|---------------------------------|--------------------------|-------------|------------------|
| | Amounts brought forward, | \$ 244.13 | \$ 843.60 |
| Third payment, | | 400.00 | |
| Interest for 5 months, | | 10.00 | |
| Fourth payment, | | 100.00 | |
| Interest for 2 months, 27 days, | | <u>1.45</u> | <u>\$ 755.58</u> |
| Remains due June 1, 1843, | | | \$ 88.02 |

| y. 1843 | mo. 5 | d. 1 | y. 1843 | mo. 5 | d. 1 | y. 1843 | mo. 5 | d. 1 |
|-------------------|-----------|-----------|------------------|----------|-----------|------------------|----------|----------|
| 1842 | 6 | 4 | 1842 | 7 | 10 | 1842 | 10 | 1 |
| | <u>10</u> | <u>27</u> | | <u>9</u> | <u>21</u> | | <u>7</u> | <u>0</u> |
| \$ 800 | | | \$ 144 | | | \$ 90 | | |
| <u>.0541</u> | | | <u>.0481</u> | | | <u>.035</u> | | |
| <u>3200</u> | | | <u>1152</u> | | | <u>450</u> | | |
| 4000 | | | 576 | | | 270 | | |
| <u>400</u> | | | <u>72</u> | | | <u>\$ 3.15,0</u> | | |
| <u>\$ 43.60,0</u> | | | <u>\$ 6.98,4</u> | | | | | |

| y. 1843 | mo. 5 | d. 1 | y. 1843 | mo. 5 | d. 1 |
|-------------------|----------|----------|------------------|----------|-----------|
| 1843 | 0 | 1 | 1843 | 2 | 4 |
| | <u>5</u> | <u>0</u> | | <u>2</u> | <u>27</u> |
| \$ 400 | | | \$ 100 | | |
| <u>.025</u> | | | <u>.0141</u> | | |
| <u>2000</u> | | | <u>400</u> | | |
| 800 | | | 100 | | |
| <u>\$ 10.00,0</u> | | | <u>50</u> | | |
| | | | <u>\$ 1.45,0</u> | | |

(ART. 204, p. 211.)

(2.)

| | | |
|---|-----------|-------------------|
| Principal, carrying interest from June 5, 1838, | | \$ 1666.00 |
| Interest from June 5, 1838, to January 1, 1841, | | |
| 30 months, 26 days, | | <u>257.11</u> |
| Amount carried forward, | | <u>\$ 1923.11</u> |

| | |
|---|-----------------------------------|
| Amount brought forward, | \$ 1923.11 |
| First payment, July 4, 1839, a sum less than the interest, | \$ 100.00 |
| Second payment, Jan. 1, 1840, a sum less than the interest, | 10.00 |
| Third payment, July 4, 1840, a sum less than the interest, | 15.00 |
| Fourth payment, Jan. 1, 1841, a sum lar- ger than the interest, | <u>500.00</u> |
| | 625.00 |
| | <u>1298.11</u> |
| Interest from Jan. 1, 1841, to Feb. 7, 1842, 13 months, 6 days, | 85.67 |
| | Amount, 1383.78 |
| Fifth payment, Feb. 7, 1842, | <u>656.00</u> |
| | 727.78 |
| Interest from Feb. 7, 1842, to Jan. 1, 1843, 10 months, 24 days, | 39.30 |
| Remains due Jan. 1, 1843, | <u>\$ 767.08</u> |
| (3.) | |
| Principal on interest from Oct. 23, 1840, | \$ 960.00 |
| Interest from Oct. 23, 1840, to Sept. 25, 1841, 11 months, 2 days, | 61.97 |
| | Amount, 1021.97 |
| First payment, Sept. 25, 1841, | 140.00 |
| New principal, carrying interest from Sept. 25, 1841, | 881.97 |
| Interest from Sept. 25, 1841, to July 7, 1842, 9 months, 12 days, | 48.36 |
| | Amount, 930.33 |
| Second payment, July 7, 1842, | 80.00 |
| New principal, carrying interest from July 7, 1842, | 850.33 |
| Interest from July 7, 1842, to Dec. 9, 1842, 5 months, 2 days, | 25.13 |
| | Amount carried forward, \$ 875.46 |

| | | |
|---|-------------------------|------------------|
| | Amount brought forward, | \$ 875.46 |
| Third payment, Dec. 9, 1842, | | <u>70.00</u> |
| New principal, carrying interest from Dec. 9, 1842, | | 805.46 |
| Interest from Dec. 9, 1842, to Nov. 8, 1843, | | <u>51.52</u> |
| 10 months, 29 days, | | <u>51.52</u> |
| | Amount, | 856.98 |
| Fourth payment, Nov. 8, 1842, | | <u>100.00</u> |
| New principal, carrying interest Nov. 8, 1843, | | 756.98 |
| Interest from Nov. 8, 1843, to Oct. 23, 1844, | | <u>50.78</u> |
| 11 months, 15 days, | | <u>50.78</u> |
| Balance due Oct. 23, 1844, | | <u>\$ 807.76</u> |

(4.)

| | | |
|---|-------------------------|---------------|
| Principal on interest from March 1, 1839, | | \$ 1000.00 |
| Interest from March 1, 1839, to March 1, 1840, | | <u>70.00</u> |
| 12 months, | | <u>70.00</u> |
| | Amount, | 1070.00 |
| First payment, March 1, 1840, | | <u>100.00</u> |
| Principal, carrying interest from March 1, 1840, | | 970.00 |
| Interest from March 1, 1840, to Sept. 25, 1841, | | <u>106.37</u> |
| 18 months, 24 days, | | <u>106.37</u> |
| | Amount, | 1076.37 |
| Second payment, Sept. 25, 1841, | | <u>200.00</u> |
| Principal carrying interest from Sept. 25, 1841, | | 876.37 |
| Interest from Sept. 25, 1841, to Oct. 9, 1842, | | <u>63.73</u> |
| 12 months, 14 days, | | <u>63.73</u> |
| | Amount, | 940.10 |
| Third payment, Oct. 9, 1842, | | <u>150.00</u> |
| Principal carrying interest from Oct. 9, 1842, | | 790.10 |
| Interest from Oct. 9, 1842, to Oct. 9, 1843, 12 months, | | <u>55.30</u> |
| | Amount carried forward, | \$ 845.40 |

Amount brought forward, \$ 845.40

| | | |
|---|---------|------------------|
| Fourth payment, July 4, 1843, a sum less than the interest, | • • • • | \$ 20.00 |
| Fifth payment, Oct. 9, 1843, a sum greater than the interest, | | <u>300.00</u> |
| | | <u>320.00</u> |
| Principal carrying interest from Oct 9, 1843, . . . | | 525.40 |
| Interest from Oct. 9, 1843, to Dec. 1, 1844, 13 months, 22 days, | | <u>42.09</u> |
| Balance due Dec. 1, 1844, | | <u>\$ 567.49</u> |

PROBLEMS IN INTEREST.

2. (ART. 207, p. 213.) $\$250 \times .0125 = \3.125 ; $\$28.125 \div 3.125 = 9$ per cent., Ans.
3. $\$72 \times .0175 = \1.26 ; $\$8.82 \div 1.26 = 7$ per cent., Ans.
4. $\$500 \times .025 = \12.50 ; $\$550 - \$500 = \$50$; $\$50 \div 12.50 = 4$ per cent. Ans.

2. (ART. 208.) $\$140 \times .06 = \8.40 ; $\$42.00 \div 8.40 = 5$ years, Ans.
3. $\$165 \times .06 = \9.90 ; $\$14.85 \div 9.90 = 1$ year,
6 months, Ans.
4. $\$98 \times .08 = \7.84 ; $\$25.48 \div 7.84 = 3$ years,
3 months, Ans.
5. $\$727.60 - \$680 = \$47.60$; $\$680 \times .04 = \27.20 ;
 $\$47.60 \div 27.20 = 1$ year, 9 months, Ans.

2. (ART. 209, p. 214.) $\$1.00 \times .255 = \0.255 ; $\$24.225 \div .255 = \95 Ans.
3. $\$1.00 \times .28 = \0.28 ; $\$5.11 \div .28 = \18.25 Ans.
4. $\$1.00 \times .15 = \0.15 ; $\$42 \div .15 = \280 Ans.

COMPOUND INTEREST.

2. (ART. 211, p. 216.) $1.06 \times 1.06 \times 1.06 \times 1.06 \times \$761.75 = \$961.69,1$; $\$961.69,1 - \$761.75 = \$199.94,1$ Ans.
3. $1.06 \times 1.06 \times 1.06 \times \$67.25 = \$80.09,5$ Ans.
4. $1.07 \times 1.07 \times 1.07 \times 1.07 \times 1.07 \times \$78.69 = \$110.36,4$ Ans.
5. $1.06 \times 1.06 \times 1.06 \times 1.028 \times \$128 = \$156.71,7$ Ans.
6. $1.06 \times 1.06 \times 1.041\frac{1}{2} \times \$76.18 = \$89.14,7$; $\$89.14,7 - \$76.18 = \$12.96,7$ Ans.

2. (ART. 212, p. 217.) $\$1.315931$, amount of $\$1$ for 7 years at 4 per cent.; $\$884 \times 1.315931 = \$1163.28,3$; $\$1163.28,3 - \$884 = \$279.28,3$ Ans.
3. $\$1.551328$, amount of $\$1$ for 9 years at 5 per cent.; $\$721 \times 1.551328 = \$1118.50,7$; $\$1118.50,7 - \$721 = \$397.50,7$ Ans.
4. $\$1.425760$, amount of $\$1$ for 12 years at 3 per cent.; $\$960 \times 1.425760 = \$1368.72,96$; $\$1.015$, amount of $\$1$ for 6 months at 3 per cent.; $\$1368.72,96 \times 1.015 = \1389.26 Ans.
5. $\$3.869685$, amount of $\$1$ for 20 years, at 7 per cent.; $\$25.50 \times 3.869685 = \$98.67,696$; $\$1.014$, amount of $\$1$ for 2 months and 12 days at 7 per cent.; $\$98.67,696 \times 1.014 = \$100.05,8$ Ans.
6. $\$1.005$, amount of $\$1$ for 1 month; $\$1.005 \times 1.005 \times 1.005 \times 1.005 \times 1.005 = \1.03037 , amount of $\$1$ for 6 months; $\$1.03037 \times 12 = \$12.36,444+$ Ans.
7. $\$1.000\frac{1}{2}$ amount of $\$1$ for 1 day; $\$1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} = \$1.0010006+$, amount of $\$1$ for 6 days; $\$1.0010006+ \times 100 = \$100.10,006+$ Ans.

DISCOUNT.

2. (Art. 216, p. 219.) \$ 1.06 amount of \$ 1 for 1 year;
 $\$ 152.64 \div 1.06 = \$ 144$ Ans.
3. \$ 1.24 amount of \$ 1 for 4 years; $\$ 477.71 \div 1.24 = \$ 385.25$ Ans.
4. \$ 1.20 amount of \$ 1 for 3 years, 4 months; $\$ 172.86 \div 1.20 = \$ 144.05$; $\$ 172.86 - \$ 144.05 = \$ 28.81$ Ans.
5. \$ 1.218 amount of \$ 1 for 3 years, 7 months, 18 days;
 $\$ 800 \div 1.218 = \$ 656.814 +$; $\$ 800 - \$ 656.814 = \$ 143.18$, 6 Ans.
6.

| | | | |
|-------------|---------|----------|---------|
| <u>1844</u> | y. 0 | mo. 1 | d. 1 |
| <u>1842</u> | 9 | 4 | |
| 1 2 27 | | | |

 \$ 1.0745 amount of \$ 1.00 for 1 year,
 2 months, 27 days; $\$ 375.75 +$
 1.0745 = \$ 349.69, 7 Ans.
7.

| | | | |
|-------------|---------|----------|---------|
| <u>1843</u> | y. 3 | mo. 5 | d. 1 |
| <u>1843</u> | 0 | 1 | |
| 3 4 | | | |

 \$ 1.015 $\frac{1}{2}$ amount of \$ 1.00 for 3 months,
 4 days; $\$ 125.75 \div 1.015\frac{1}{2} =$
 \$ 123.81 + Ans.

BANK DISCOUNT.

(Art. 218, p. 221.)

| (2.) | (3.) | (4.) | (5.) |
|--------------------|--------------------|-------------------|-----------------------|
| \$ 478 | \$ 780 | \$ 1728 | \$ 1000 |
| .010 $\frac{1}{2}$ | .005 $\frac{1}{2}$ | .15 $\frac{1}{2}$ | .20 $\frac{1}{2}$ |
| <u>4780</u> | <u>3900</u> | <u>8640</u> | <u>20000</u> |
| 239 | 390 | 1728 | 500 |
| <u>\$ 5.01,9</u> | <u>\$ 4.29,0</u> | <u>864</u> | <u>\$ 20.50,0</u> |
| | | <u>\$ 26.78,4</u> | <u>\$ 1000</u> |
| | | | <u>20.50</u> |
| | | | <u>Ans. \$ 979.50</u> |

| (6.) | (7.) | (8.) |
|---------------------|----------------------|----------------------|
| \$ 875.35 | \$ 596.24 | \$ 1350.50 |
| .038 | .042 | .080 |
| <u>700280</u> | <u>119248</u> | <u>10804000</u> |
| 262605 | 238496 | 67525 |
| <u>6) 33.26,330</u> | <u>25.04,208</u> | <u>108.71,525</u> |
| 5.54,386 | 8 | 5 |
| <u>\$ 38.80,716</u> | <u>6) 200.33,664</u> | <u>6) 543.57,625</u> |
| \$ 875.35,0 | \$ 33.38,944 | Ans. \$ 90.59,604 |
| 38.80,7 | \$ 596.24,0 | |
| <u>\$ 836.54,2</u> | <u>33.38,9</u> | |
| Ans. | | |
| | \$ 562.85,1 | Ans. |

2. (Art. 219, p. 222.) \$ 1.0000 — .0205 = .9795 ; \$ 300 + .9795 = \$ 306.27,8 Ans.
 3. \$ 1.0000 — .0305 = .9695 ; \$ 4572.40 ÷ .9695 = \$ 4716.24,5 Ans.
 4. \$ 1.0000 — .0255 = .9745 ; \$ 1000 ÷ .9745 = \$ 1026.16,7 Ans.
 5. \$ 1.000000 — .50625 = .949375 ; \$ 483.56 ÷ .949375 = \$ 509.34,5 Ans.
-

COMMISSION AND BROKERAGE.

(Art. 221, p. 223.)

| (2.) | (3.) | (4.) | (5.) |
|------------------|------------------|-----------------|--------------------|
| \$ 5678 | \$ 7896 | \$ 1728 | \$ 15.50 |
| .03 | .02 | .01 | .97 |
| <u>\$ 170.34</u> | <u>\$ 157.92</u> | <u>1728</u> | <u>10850</u> |
| | | 864 | 13950 |
| | | <u>\$ 25.92</u> | <u>1503.50</u> |
| | | | .02 |
| | | | <u>30.07,00</u> |
| | | | 7.51,75 |
| | | | <u>\$ 37.58,75</u> |
| | 8 * | | |

| (6.) | (7.) | (8.) |
|----------------------------|-------------------------|-------------------|
| \$ 6.50 | \$ 2.75 | \$ 2500 |
| 500 | 88 | .00 $\frac{1}{2}$ |
| <u>3250.00</u> | <u>2200</u> | <u>\$ 12.50</u> |
| 242.00 | 2200 | |
| <u>593.60</u> | <u><u>\$ 242.00</u></u> | |
| 4085.60 | | |
| .03 $\frac{1}{2}$ | | |
| <u>1225680</u> | | |
| 306420 | | |
| <u><u>\$ 153.21,00</u></u> | | |

2. (Art. 222, p. 224.) $\$2000 \div 1.015 = \$1970.44,3$, sum invested; $\$2000 - \$1970.44,3 = \$29.55,7$, commission, Ans.
3. $\$5256 \div 1.03 = \$5102.91,2$; $\$5256 - \$5102.91,2 = \$153.08,8$ Ans.
4. $\$3865.94 \div 1.04 = \3717.25 , sum expended; $\$3865.94 - \$3717.25 = \$148.69$, commission, Ans.
5. $\$10000 \div 1.0325 = \$9685.23+$, value of flour; $\$10000 - \$9685.23+ = \$314.76+$, commission, Ans.

STOCKS.

3. (Art. 224, p. 225.) $\$115 \times 10 = \1150 Ans.
4. $\$125 \times .75 = \9375 Ans.
5. $\$8979 \times 1.12 = \10056.48 Ans.
6. $\$1789 \times .91 = \1627.99 Ans.
7. $\$100 \times .12 = \12 ; $\$12 \times 5 = \60 Ans.
8. $\$100 - \$12.50 = \$87.50$; $\$87.50 \times 20 = \1750 Ans.
9. $\$100 + \$8.25 = \$108.25$; $\$108.25 \times 15 = \1623.75 , Ans.
10. $\$175 \times .12 = \21 ; $\$175 - \$21 = \$154$; $\$154 \times .87 = \13398 ; $\$175 \times .19\frac{1}{2} = \$34.12\frac{1}{2}$; $\$175 + \$34.12\frac{1}{2} = \$209.12\frac{1}{2}$; $\$209.12\frac{1}{2} \times .87 = \$18193.87\frac{1}{2}$, $\$18193.87\frac{1}{2} - \$13398.00 = \$4795.87\frac{1}{2}$ Ans.

INSURANCE.

(ART. 226, p. 226.)

| (2.) | (3.) | (4.) |
|-------------------------|------------------|----------------------------|
| \$ 868 | \$ 1728 | \$ 3500 |
| .12 | .15 | .01 $\frac{1}{4}$ |
| <u>\$ 104.16</u> | <u>8640</u> | <u>3500</u> |
| | 1728 | 2625 |
| | <u>\$ 259.20</u> | <u>\$ 61.25</u> |
| | | |
| - (5.) | | (6.) |
| \$ 35000 | | \$ 75000 |
| .03 $\frac{1}{4}$ | | .02 $\frac{1}{2}$ |
| <u>105000</u> | | <u>150000</u> |
| 26250 | | 37500 |
| <u>\$ 1312.50</u> | | <u>\$ 1875.00</u> premium. |
| \$ 35000.00 | | \$ 75000 |
| 1312.50 | | 1875 |
| <u>Ans. \$ 33687.50</u> | | <u>\$ 73125</u> loss. |

DUTIES.

(ART. 228, p. 228.)

| (2.) | (3.) | (4.) |
|-------------------|-------------------|--------------------|
| 560lb. | 368lb. | 187 |
| 4 | 4 | 196 |
| <u>556</u> | <u>364</u> | <u>216</u> |
| 44 | 44 | 150 |
| <u>512</u> | <u>320</u> | <u>749</u> |
| 144 | 760 | <u>15 leakage.</u> |
| <u>2048</u> | <u>19200</u> | <u>734</u> |
| <u>2048</u> | <u>2240</u> | <u>20</u> |
| <u>512</u> | <u>243200</u> | <u>714</u> |
| <u>73728</u> | <u>.02</u> | <u>.25</u> |
| <u>.03</u> | <u>\$ 4864.00</u> | <u>3570</u> |
| <u>\$ 2211.84</u> | | <u>1428</u> |
| | | <u>\$ 178.50</u> |

KEY TO

2. (Art. 229, p. 228.) $\$3200 \times .20 = \640 Ans.
 3. 1 Ton = 2240lb.; 2240lb. — 9lb. = 2231lb. net; 2231 × .04 = \$89.24; \$89.24 × .30 = \$26.77,2, duty, Ans.
 4. 1698lb. — 7lb. = 1691lb. net weight; 1691 × .05 = \$84.55; \$84.55 × .20 = \$16.91, duty, Ans.
 5. $150 \times 10 = 1500$; $1500 - 30 = 1470$; $1470 - 50 = 1420$; $1420 \times .25 = \$355$; $\$355 \times .20 = \71 , duty, Ans.
 6. 450lb. — 4lb. = 446lb.; $446 \times .15 = 67$; $446 - 67 = 379$ lb.; $379 \times 13 = 4927$ lb. net weight; $4927 \times .08 = \$394.16$; $\$394.16 \times .30 = \118.24 Ans. [Ans.]
 7. $1376 \times \$4.84 = \6659.84 ; $\$6659.84 \times .33 = \$2197.74,7$,
-

ASSESSMENT OF TAXES.

(Art. 231, p. 230.)

(2.)

- \$1.25 × 600 = \$750, amount assessed on the polls.
 \$3600 — \$750 = \$2850, am't to be assessed on the property.
 \$560,000 + \$152,500 = \$712,500, am't of taxable property.
 $\$2850 \div 712,500 = \$.004$, tax on \$1.00.
 $\$4100 \times .004 = \16.40 , B.'s tax on real estate.
 $\$1800 \times .004 = \7.20 , B.'s tax on personal property.
 $\$1.25 \times 4 = \5.00 , B.'s tax on 4 polls.
 $\$16.40 + \$7.20 + \$5.00, = \28.60 , B.'s tax.

(3.)

- $\$15,800 \times .004 = \63.20 , tax on C.'s property.
 $\$1.25 \times 1 = \1.25 , C.'s tax on 1 poll.
 $\$63.20 + \$1.25 = \$64.45$, C.'s tax, Ans.

(4.)

- $\$40,000 \times .004 = \160 , tax on D.'s real estate.
 $\$23,600 \times .004 = \94.40 , tax on D.'s personal property.
 $\$1.25 \times 3 = \3.75 , D.'s tax for 3 polls.
 $\$160 + \$94.40 + \$3.75 = \258.15 , am't of D.'s tax, Ans.

(ART. 232, p. 231.)

(1.)

 $\$1.50 \times 500 = \750.00 , amount assessed on the polls. $\$3900 - \$750 = \$3150$, am't to be assessed on the property. $\$840,000 + \$210,000 = \$1,050,000$, am't of taxable property. $\$3150 \div 1,050,000 = .003$, assessment on \$1.00.

(3.)

| | | |
|------------|---------------------------|---------------------------|
| $\$3175$ | Tax on $\$9000 = \27.00 | Tax on $\$7000 = \21.00 |
| $\$6535$ | " 700 = 2.10 | " 400 = 1.20 |
| " 10 = .03 | " 80 = .24 | |
| $\$9710$ | " 6 polls = 9.00 | " 1 poll = 1.50 |
| | Ans. \$38.13 | Ans. \$23.94 |

(5.)

Tax on \$4000 = \$12.00

" 700 = 2.10

" 90 = .27

" 2 polls = 3.00

Ans. \$17.37

(6.)

Tax on \$12000 = \$36.00

" 800 = 2.40

" 80 = .24

" 4 polls = 6.00

Ans. \$44.64

EQUATION OF PAYMENTS.

(ART. 234, p. 233.)

(2.)

$$\begin{array}{rcl} \$250 \times 4 = 1000 & & \\ \$350 \times 8 = 2800 & & \\ \$400 \times 12 = 4800 & & \\ \hline \$1000 & 1000) 8600 \text{ (8mo.} & \end{array}$$

8000

600

30

1000) 18000 (18da.
18000

Ans. 8mo. 18da.

(3.)

$$\begin{array}{rcl} \$390 \times 3 = 1170 & & \\ \$312 \times 6 = 1872 & & \\ \$260 \times 8 = 2080 & & \\ \$598 \times 10 = 5980 & & \\ \hline \$1560 & 1560) 11102 (7, \frac{8}{3} \text{ mo.} & \end{array}$$

10920

182

1560

= $\frac{81}{60}$

(4.)

$$\begin{array}{r} \$1000 \\ \$1000 \times 12 = 12000 \\ \$2000 \times 24 = 48000 \\ \$4000 \quad 4000) 60000(15\text{mo.} \end{array}$$

(5.)

$$\begin{array}{r} \$1250 \\ \$1250 \times 6 = 7500 \\ \$1000 \times 9 = 9000 \\ \$1500 \times 12 = 18000 \\ \$5000 \quad 5000) 34500(6\text{mo.} \\ \underline{30000} \\ 4500 \\ \underline{30} \\ 5000) 135000(27\text{da.} \\ \underline{10000} \\ 35000 \\ \underline{35000} \end{array}$$

(ART. 235, p. 235.)

(2.)

Due April 15, \$96.46

$$\begin{array}{r} " \quad 24, \quad 49.63 \times 9 = 44667 \\ \text{May } 1, \quad 175.80 \times 16 = 281280 \\ " \quad 11, \quad 78.39 \times 26 = 203814 \\ \text{Sept. } 19, \quad 114.92 \times 157 = 1804244 \end{array}$$

$$\begin{array}{r} \$515.20 \quad 51520) 2334005(45+\text{da.} \\ \underline{206080} \\ 273205 \\ \underline{257600} \end{array}$$

Ans. May 31st, or in 46da.

15605

(3.)

Due May 7, 1841, \$375.60

$$\begin{array}{r} \text{Aug. } 18, \quad " \quad 687.25 \times 103 = 7078675 \\ \text{Dec. } 7, \quad " \quad 568.50 \times 214 = 12165900 \\ \text{March } 1, 1842, \quad 100.00 \times 298 = 2980000 \\ " \quad 25, \quad " \quad 300.00 \times 322 = 9660000 \\ \text{Aug. } 5, \quad " \quad 675.75 \times 455 = 30746625 \end{array}$$

$$\begin{array}{r} \$2707.10 \quad 270710) 62631200(231+\text{da.} \\ \underline{541420} \end{array}$$

$$\begin{array}{r} 848920 \\ 812130 \\ \hline 367900 \\ 270710 \\ \hline 97190 \end{array}$$

Ans. Dec. 25, or in 232da.

(4.)

Due April 1, 1847, \$436.50

| | | | | |
|----------------|----------|---|-------|---------|
| " 11, | " 129.50 | × | 10 = | 129500 |
| July 15, | " 132.00 | × | 105 = | 1386000 |
| Sept. 1, | " 405.00 | × | 153 = | 6196500 |
| " 5, | " 72.00 | × | 157 = | 1130400 |
| Oct. 25, | " 91.00 | × | 207 = | 1883700 |
| Feb. 29, 1848, | 120.00 | × | 334 = | 4008000 |

\$ 1386.00 138600) 14734100(106 + da.
138600
874150
831600
42550

Ans. July 17, or in 107da.

(5.)

Due July 1, 1844, \$300

| | | | | |
|----------------|--------------|---|------|-------------|
| Nov. 1, | " 500 | × | 4 = | 2000 |
| March 1, 1845, | 200 | × | 8 = | 1600 |
| Oct. 1, | " 800 | × | 15 = | 12000 |
| April 1, 1847, | 400 | × | 33 = | 13200 |
| July 1, | " 900 | × | 36 = | 32400 |
| Aug. 1, | " <u>100</u> | × | 37 = | <u>3700</u> |

\$ 3200 3200) 64900(20mo. 9da.
6400
900
30
3200) 27000(8 + da.
25600
1400

Ans. March 10, 1846.

PROPORTION.

SIMPLE PROPORTION.

5. (Art. 248, p. 241.) 63gal. : 9gal. :: \$ 14.49 : \$ 2.07 Ans.
6. 19A. : 97A. :: \$ 337.25 : \$ 1721.75 Ans.
7. 11da. : 47da. :: 319 miles : 1363 miles, Ans.
8. 4lb. : 48lb. :: 7lb. : 84lb. Ans.

9. \$ 5437.50 : \$ 7687.50 :: 87 tons : 123 tons, Ans.
10. 15bar. : 79bar. :: \$ 120 : \$ 632 Ans.
11. 3 days : 12 days :: 9 horses : 36 horses, Ans.
12. 7gal. : 27gal. :: \$ 5.88 : \$ 22.68 Ans.
13. 9lb. : 147lb. :: \$ 10.80 : \$ 176.40 Ans.
14. 9 tons : 27 tons :: \$ 85.95 : \$ 257.85 Ans.
15. 15 tons : 765 tons :: \$ 105 : \$ 5355 Ans.
16. 16hhd. : 176hhd. :: \$ 320 : \$ 3520 Ans.
17. 15cwt. 3qr. 17lb. = 1781lb. : 76cwt. 2qr. 19lb. = 8587lb.
:: \$ 124.67 : \$ 601.09 Ans.
18. 7s. 6d. = 90d. : 76£. 19s. 11d. = 18479d. :: \$ 1 :
\$ 205.32 $\frac{1}{3}$ Ans.
19. 8s. = 96d. : 19£. 19s. 8d. = 4796d. :: \$ 1 : \$ 49.95+ Ans.
20. 4s. 8d. = 56d. : 176£. 18s. 4d. = 42460d. :: \$ 1 :
\$ 758.21+ Ans.
21. 4s. 6d. = 54d. : 769£. 18s. 9d. = 184785d. :: \$ 1 :
\$ 3421.94+ Ans.
22. 1m. : 32m. :: 2m. 8sec. = 128sec. : 4096sec. = 1h. 8m.
16sec. Ans.
23. 1A. = 160p. : 144A. 3R. 17p. = 23177p. :: \$ 37.86 :
\$ 5484.25+ Ans.
24. 1h. = 3600sec. : 9h. 45m. 19sec. = 35119sec. :: 3m. 7fur.
18rd. = 1258rd. : 12272+rd. = 38m. 2fur. 32+rd. Ans.
25. 21 - 15 = 6rd. : 21rd. :: 96rd. : 336rd. Ans.
26. 4 + 5 = 9 men : 5 men :: 12h. : 6 $\frac{2}{3}$ h. Ans.
27. 10 - 3 = 7 men : 10 men :: 63da. : 90da. Ans.
28. \$ 7.50 : \$ 5.00 :: 5oz. : 3 $\frac{1}{2}$ oz. Ans.
29. 13h. : 14h. :: 10da. : 10 $\frac{1}{2}$ da. Ans.
30. 40lb. : 79lb. :: 29lb. : 57 $\frac{1}{2}$ lb. Ans.
34. 11 $\frac{1}{2}$ yd. : 100yd. :: 4 $\frac{7}{11}$ yd. = $\frac{59}{6}$: $\frac{100}{11}$:: $\frac{59}{6} \times \frac{11}{59} = \frac{1}{6}$
 $\times \frac{1}{6} = \frac{1}{36}$ = 39 $\frac{1}{6}$ yd. Ans.
35. 5 $\frac{6}{11}$ cwt. : 25 $\frac{7}{11}$ cwt. :: 14 $\frac{7}{8}$ E. E. = $\frac{11}{4}$: $\frac{282}{61}$:: $\frac{11}{4}$
= $\frac{11}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{11}{64}$ qr. = $\frac{11}{61} \times \frac{282}{11} \times \frac{595}{32} = \frac{167790}{1952}$
= 85yd. 3qr. 3 $\frac{2}{3}$ na. Ans.

36. $48\text{da.} : 36\text{da.} :: 144 \text{ men} : 108 \text{ men}$; $144 - 108 = 36$
 men, Ans.
37. $\frac{d}{6} : \frac{d}{1} :: \frac{w}{\frac{1}{6}}$, the part James will do in one day.
 $\frac{8}{1} : 1 :: 1 : \frac{1}{8}$, the part John will do in one day.
 $\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$, the part James and John will do in one day.
 $\frac{7}{24}w. : 1w. :: 1\text{da.} : 3\frac{3}{4}\text{da.}$ Ans.
38. $9\text{h.} : 1\text{h.} :: 1w. : \frac{1}{8}w. =$ part Samuel will do in one day.
 $4\text{h.} : 1\text{h.} :: 1w. : \frac{1}{4}w. =$ part Samuel and Alfred will do
 in one day.
 $\frac{1}{4} - \frac{1}{8} = \frac{1}{8} =$ part Alfred will do in one day.
 $\frac{5}{8}w. : 1w. :: 1\text{h.} : 7\frac{1}{8}\text{h.}$ Ans.
39. $10\text{da.} : 1\text{da.} :: 1w. : \frac{1}{10}w. =$ part Atwood would do in a
 day.
 $7\text{da.} : 1\text{da.} :: 1w. : \frac{1}{7}w. =$ part Jerry and his father would
 do in a day.
 $6\text{da.} : 1\text{da.} :: 1w. : \frac{1}{6}w. =$ part Jacob and his father
 would do in a day.
 $\frac{1}{7} - \frac{1}{10} = \frac{3}{70} =$ part Jerry would do in a day.
 $\frac{1}{6} - \frac{1}{10} = \frac{1}{15} =$ part Jacob would do in a day.
 $\frac{3}{70} + \frac{1}{15} = \frac{23}{210} =$ part Jerry and Jacob would do in a day.
 $\frac{23}{210}w. : 1w. :: 1\text{da.} : 9\frac{2}{3}\text{ days,}$ Ans.
41. $\$5.00 \times 40 = \200.00 , price given for the cloth;
 $\$1.00 : \$1.15 :: \$200.00 : \230.00 Ans.
42. $\$1.00 : \$0.70 :: \$175.00 : \122.50 Ans.
43. $\$6.00 - \$5.00 = \$1.00$;
 $\$5.00 : \$1.00 :: \$100 : 20$ per cent., Ans.
44. $\$15.00 - \$12.00 = \$3.00$;
 $\$15.00 : \$3.00 :: \$100 : 20$ per cent., Ans.
45. $1\frac{3}{4} - \frac{8}{10} = \frac{10}{10} - \frac{8}{10} :: \$60 : \$120$ Ans.
46. $\$0.25 : \$27.50 :: 1\text{gal.} : 110$ gallons, Ans.
47. $\$15.75 : \$1728 :: 1\text{A.} : 109\text{A.} 2\text{R.} 34\frac{2}{3}\text{p.}$ Ans.
48. If the first cock will empty the cistern in 2 hours, in 1 hour
 $\frac{1}{2}$ of it will be emptied. The second cock will empty $\frac{1}{3}$ of it in 1 hour.
 The third cock will empty $\frac{1}{4}$ of it in 1 hour. Therefore, in 1 hour, $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$ of the

cistern will be emptied. And if $\frac{1}{2}$ of the cistern be emptied in 1 hour, $\frac{1}{2}$, or the whole cistern, will be emptied in $55\frac{5}{13}$ minutes; $\frac{1}{2} : \frac{1}{2} :: 60m. : 55\frac{5}{13}m.$ Ans.

COMPOUND PROPORTION.

(ART. 250, p. 246.)

$$\begin{array}{l} (3.) \\ \$800 : \$100 \\ \$6 : \$32 \end{array} \left\{ \begin{array}{l} :: 12mo. : 8mo. \text{ Ans.} \\ :: 8mo. : 12mo. \end{array} \right. \quad \frac{\cancel{100} \times \cancel{32} \times \cancel{12}}{\cancel{800} \times \cancel{6}} = \frac{4}{8} = 8 \text{ mo.}$$

$$\begin{array}{l} (4.) \\ \$6 : \$32 \\ 8mo. : 12mo. \end{array} \left\{ \begin{array}{l} :: \$100 : \$800 \text{ Ans.} \\ :: 8mo. : 12mo. \end{array} \right. \quad \frac{\cancel{32} \times \cancel{12} \times 100}{\cancel{6} \times \cancel{8}} = \frac{4}{2} = \$800$$

$$\begin{array}{l} (5.) \\ \$800 : \$100 \\ 8mo. : 12mo. \end{array} \left\{ \begin{array}{l} :: \$32 : \$6, \text{ that is, } 6 \text{ per cent., Ans.} \\ :: 8mo. : 12mo. \end{array} \right.$$

$$\frac{\cancel{100} \times 12 \times \cancel{32}}{\cancel{800} \times \cancel{8}} = \frac{6}{2} = \$6.$$

$$\begin{array}{l} (6.) \\ 20 \text{ men} : 15 \text{ men} \\ 10 \text{ hours} : 15 \text{ hours} \end{array} \left\{ \begin{array}{l} :: 60 \text{ days} : 67\frac{1}{2} \text{ days, Ans.} \\ :: 20 \text{ men} : 15 \text{ men} \end{array} \right.$$

$$\frac{3}{2} \quad \frac{3}{2} \\ \frac{15 \times 15 \times 60}{20 \times 10} = \frac{135}{2} = 67\frac{1}{2} \text{ days.}$$

$$\begin{array}{l} (7.) \\ 351 \text{ bu.} : 1404 \text{ bu.} \\ 2 \text{ w.} : 3 \text{ w.} \end{array} \left\{ \begin{array}{l} :: 939 \text{ men} : 5634 \text{ men, Ans.} \\ :: 351 \text{ bu.} : 1404 \text{ bu.} \end{array} \right.$$

$$\frac{2}{4} \\ \frac{351 \times 3 \times 939}{1404 \times 2} = 5634 \text{ men.}$$

(8.)

$$\left. \begin{array}{l} 8 \text{ men} : 12 \text{ men} \\ 13 \text{ weeks} : 52 \text{ weeks} \end{array} \right\} :: \$64 : \$384 \text{ Ans.}$$

$$\frac{4 \quad 8}{12 \times 52 \times 64} = \frac{8}{\$ \times 13} = \$384$$

(9.)

$$\left. \begin{array}{l} 8 \text{ horses} : 32 \text{ horses} \\ 24 \text{ days} : 48 \text{ days} \end{array} \right\} :: 42 \text{ bushels} : 336 \text{ bushels, Ans.}$$

$$\frac{4 \quad 2}{32 \times 48 \times 42} = \frac{2}{\$ \times 24} = 336 \text{ bushels.}$$

(10.)

$$\left. \begin{array}{l} 24 \text{ men} : 6 \text{ men} \\ 16 \text{ hours} : 9 \text{ hours} \\ 20 \text{ feet} : 200 \text{ feet} \\ 6 \text{ feet} : 16 \text{ feet} \\ 4 \text{ feet} : 6 \text{ feet} \end{array} \right\} :: 16 \text{ days} : 90 \text{ days, Ans.}$$

$$\frac{10}{\$ \times 9 \times 200 \times 16 \times 6 \times 16} = \frac{4}{24 \times 16 \times 20 \times 6 \times 4} = 90 \text{ days.}$$

(11.)

$$\left. \begin{array}{l} 15 \text{ days} : 20 \text{ days} \\ 9 \text{ hours} : 12 \text{ hours} \end{array} \right\} :: 117 \text{ miles} : 208 \text{ miles, Ans.}$$

$$\frac{4 \quad 4 \quad 13}{20 \times 12 \times 117} = \frac{13}{15 \times 9} = 208 \text{ miles.}$$

(12.)

$$\left. \begin{array}{l} 30 \text{ men} : 12 \text{ men} \\ 30 \text{ feet} : 300 \text{ feet} \\ 6 \text{ feet} : 8 \text{ feet} \\ 3 \text{ feet} : 6 \text{ feet} \\ 8 \text{ hours} : 12 \text{ hours} \end{array} \right\} :: 15 \text{ days} : 240 \text{ days, Ans.}$$

$$\frac{4 \quad 10 \quad 4}{12 \times 300 \times 8 \times 6 \times 12 \times 15} = \frac{2}{30 \times 30 \times 6 \times 3 \times 8} = 240 \text{ days.}$$

(13.)

$$\begin{array}{l} 644 \text{lb. : } 865 \text{lb.} \\ 150 \text{ miles : } 32 \text{ miles} \end{array} \left\{ \right. \therefore \$24.58 : \$7.04 + \text{Ans.}$$

$$\frac{173 \quad 4}{644 \times 150} = \frac{865 \times 32 \times 24.58}{173 \times 4 \times 150} = \frac{173000.32}{2416} = \$7.04 +.$$

$$\begin{array}{r} 161 \\ 15 \end{array}$$

(14.)

$$\begin{array}{l} \$1800 : \$600 \\ \$9 : \$9 \end{array} \left\{ \right. \therefore 6 \text{ months} : 2 \text{ months, Ans.}$$

$$\frac{2}{\frac{\$600 \times 9 \times 6}{\$1800 \times 9}} = 2 \text{ months.}$$

(15.)

$$\begin{array}{l} 20 \text{ cows : } 28 \text{ cows} \\ 8 \text{ weeks : } 12 \text{ weeks} \end{array} \left\{ \right. \therefore 3 \text{ tons} : 6\frac{3}{10} \text{ tons, Ans.}$$

$$\frac{7 \quad 3}{20 \times 8} = \frac{28 \times 12 \times 3}{5 \quad 2} = \frac{63}{16} = 6\frac{3}{10} \text{ tons.}$$

(16.)

$$\begin{array}{l} 12\frac{5}{11} \text{ men : } 5 \text{ men} \\ 30 \text{ acres : } 54 \text{ acres} \end{array} \left\{ \right. \therefore 10 \text{ days} : 7\frac{31}{137} \text{ days, Ans.}$$

$$\frac{18}{\frac{137}{11} \times \frac{54}{30}} = \frac{90}{137} = \frac{90}{1} \times \frac{11}{137} = \frac{990}{137} = 7\frac{31}{137} \text{ days.}$$

(17.)

$$\begin{array}{l} 18 \text{ men : } 2 \text{ men} \\ 12\frac{3}{4} \text{ rods : } 247\frac{2}{13} \text{ rods} \end{array} \left\{ \right. \therefore 6\frac{1}{2} \text{ days} : 14 \text{ days, Ans.}$$

$$\frac{7}{2 \times \frac{3213}{13} \times \frac{13}{2}} = \frac{63}{13} = \frac{18 \times \frac{51}{4}}{2} = 14 \text{ days.}$$

(18.)

$$\left. \begin{array}{l} 24 \text{ men : } 248 \text{ men} \\ 9 \text{ hours : } 11 \text{ hours} \\ 7 \text{ hard. : } 4 \text{ hard.} \\ 232\frac{1}{2} \text{ feet : } 337\frac{1}{2} \text{ feet} \\ 3\frac{1}{2} \text{ feet : } 5\frac{1}{2} \text{ feet} \\ 2\frac{1}{2} \text{ feet : } 3\frac{1}{2} \text{ feet} \end{array} \right\} : : 5\frac{1}{2} \text{ days : } 132 \text{ days, Ans.}$$

$$\frac{\begin{array}{r} 3 \\ 55 \\ 135 \\ 675 \\ \hline 248 \times 11 \times 4 \times \frac{28}{2} \times \frac{7}{5} \times \frac{11}{2} \end{array}}{\begin{array}{r} 4 \\ 3 \\ \hline 24 \times 9 \times 7 \times \frac{495}{2} \times \frac{11}{3} \times \frac{7}{3} \end{array}} = 132 \text{ days.}$$

PARTNERSHIP, OR COMPANY BUSINESS.

(ART. 252, p. 249.)

(2.)

A's stock, \$ 6000 $\frac{6000}{20000} = \frac{3}{10}$, A's fractional part.B's stock, \$ 9000 $\frac{9000}{20000} = \frac{9}{20}$, B's fractional part.C's stock, \$ 5000 $\frac{5000}{20000} = \frac{1}{4}$, C's fractional part.

| | \$ 840 | \$ 20000 | \$ 840 | \$ 840 |
|-------------------|--------|-------------------|--------|-------------------|
| | 3 | | 9 | 1 |
| 10) <u>2520</u> | | 20) <u>7560</u> | | 4) <u>840</u> |
| \$ 252, A's gain. | | \$ 378, B's gain. | | \$ 210, C's gain. |

(3.)

Parker, \$ 8750 $\frac{8750}{19360} = \frac{875}{1936}$, Parker's part.Dole, \$ 3610 $\frac{3610}{19360} = \frac{361}{1936}$, Dole's part.Gage, \$ 7000 $\frac{7000}{19360} = \frac{700}{1936}$, Gage's part.

$$\$ 19360 - \$ 6875 - \$ 375 = \$ 6500$$

$$\frac{\$ 6500 \times 875}{1936} = \$ 2937.75 \frac{1}{2} = \text{Parker's dividend.}$$

$$\frac{\$ 6500 \times 361}{1936} = \$ 1212.03 \frac{62}{121} = \text{Dole's dividend.}$$

$$\frac{\$ 6500 \times 700}{1936} = \$ 2350.20 \frac{80}{121} = \text{Gage's dividend.}$$

(4.)

| | |
|-----------------|--|
| A's debt \$ 500 | $\frac{500}{2000} = \frac{1}{4}$, A's fractional part. |
| B's debt \$ 386 | $\frac{386}{2000} = \frac{193}{1000}$, B's fractional part. |
| C's debt \$ 988 | $\frac{988}{2000} = \frac{494}{1000}$, C's fractional part. |
| D's debt \$ 126 | $\frac{126}{2000} = \frac{63}{1000}$, D's fractional part. |

\$ 2000

$$\begin{array}{l|l} \$ \frac{100 \times 1}{4} = \$ 25.00, \text{A's part.} & \$ \frac{100 \times 247}{500} = \$ 49.40, \text{C's part.} \\ \$ \frac{100 \times 193}{1000} = \$ 19.30, \text{B's part.} & \$ \frac{100 \times 63}{1000} = \$ 6.30, \text{D's part.} \end{array}$$

(5.)

The whole gain is \$ 90; but C's gain is \$ 30; A and B's gain, therefore, is \$ 90 - \$ 30 = \$ 60; A's stock being \$ 700, his share of the gain will be $\frac{700}{1000} = \frac{7}{10}$ of \$ 60 = \$ 42. B's stock being \$ 300, his share of the gain will be $\frac{300}{1000} = \frac{3}{10}$ of \$ 60 = \$ 18. As the stock of each person in the firm bears the same proportion to his gain as the other, and as A's gain is \$ 42, and his stock \$ 700, therefore, \$ 42 A's gain : \$ 700 A's stock :: \$ 30 C's gain : \$ 500 C's stock. Then \$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel.

STATEMENT.

\$ 1000 : \$ 60 :: \$ 700 : \$ 42, A's gain, } Ans.
 \$ 1000 : \$ 60 :: \$ 300 : \$ 18, B's gain, } Ans.

\$ 42 : \$ 700 :: \$ 30 : \$ 500, C's stock.

\$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel, Ans.

(ART. 253, p. 250.)

(2.)

\$ 700 × 5 = 3500 $\frac{3500}{13300} = \frac{35}{133}$, A's fraction.

\$ 800 × 6 = 4800 $\frac{4800}{13300} = \frac{48}{133}$, B's fraction.

\$ 500 × 10 = 5000 $\frac{5000}{13300} = \frac{50}{133}$, C's fraction.

\$ 13300

$\frac{\$ 399 \times 35}{133} = \$ 105$, A's gain. $\frac{\$ 399 \times 48}{133} = \$ 144$, B's gain.

$\frac{\$ 399 \times 50}{133} = \$ 150$, C's gain.

(3.)

$$\text{Johnson's stock, } \$1000 \times 6 = 6000 \\ \underline{500} \\ \underline{\$1500 \times 6 = 9000}$$

 $\frac{1800}{4800} = \frac{1}{5}$, Johnson. $\underline{\$15000}$

$$\text{Hyde's stock, } \$800 \times 4 = 3200 \\ \underline{400} \\ \underline{\$1200 \times 6 = 7200} \\ \underline{500} \\ \underline{\$700 \times 2 = 1400} \\ \underline{\$11800}$$

 $\frac{11800}{43100} = \frac{1}{31}$, Hyde.

$$\text{Tyler's stock, } \$1200 \times 7 = 8400 \\ \underline{300} \\ \underline{\$1500 \times 3 = 4500} \\ \underline{200} \\ \underline{\$1700 \times 2 = 3400} \\ \underline{\$16300}$$

$$\begin{array}{r} \$15000 \\ 11800 \\ 16300 \\ \hline \$43100 \end{array}$$

$$\$ \frac{1000 \times 150}{431} = \$348.02 \frac{1}{31}, \text{ Johnson's gain.}$$

$$\$ \frac{1000 \times 118}{431} = \$273.78 \frac{2}{31}, \text{ Hyde's gain.}$$

$$\$ \frac{1000 \times 163}{431} = \$378.19 \frac{1}{31}, \text{ Tyler's gain.}$$

(4.)

The stock in trade is a horse and chaise to ride to Newburyport and back ; the whole distance being 30 miles. The expense for the horse and chaise may be considered the "loss"; and the proportional part which each rode, the "time." Now, by the rule, each man is to bear his share of the loss (expense) in proportion as he has the use of the stock in trade (horse and chaise). Morse had the use of the whole stock in trade for the first 4 and last 4 miles, for which he must pay $\frac{8}{30} = \frac{4}{15}$ of $\$3.00 = \0.80 . For the remaining part of the distance, 22 miles, the expense was $\frac{22}{30} = \frac{11}{15}$ of $\$3.00 =$

8.220. Of this sum, Jones and Morse will pay equal parts =
 $\$2.20 \div 2 = \1.10 . Morse will therefore pay $\$0.80 + \$1.10 = \$1.90$, and Jones $\$1.10$.

$$\frac{4}{5} + \frac{1}{5} \times \frac{1}{2} = \frac{9}{10}, \text{ Morse's product.}$$

$$\frac{1}{5} \times \frac{1}{2} = \frac{1}{10}, \text{ Jones's product.}$$

$$\frac{9}{10}, \text{ sum of the products.}$$

$$\begin{array}{r} \frac{9}{10} : \frac{1}{10} :: \$3.00 \\ \underline{19} \\ 2700 \\ \underline{300} \end{array}$$

30)5700 ($\$1.90 =$ Morse's share of the expense.

$$\begin{array}{r} \underline{30} \\ 270 \\ \underline{270} \\ 0 \end{array}$$

$$\begin{array}{r} \frac{9}{10} : \frac{1}{10} :: \$3.00 \\ \underline{11} \end{array}$$

30)3300 ($\$1.10 =$ Jones's share of the expense.

$$\begin{array}{r} \underline{30} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

(5.)

As Jones's capital was invested 12 months and Cotton's but 9 months, Cotton's capital must be $\frac{1}{2}$ of Jones's capital.

9 months : 12 months :: \$1000 : \$1333.33 Ans.

(6.)

$\$96 \div 8 = \12 , S's gain in 1 mo. $\frac{1}{7} =$ S's share of stock.

$\$90 \div 6 = \15 , C's gain in 1 mo. $\frac{1}{7} =$ C's share.

$\$80 \div 4 = \20 , D's gain in 1 mo. $\frac{2}{7} =$ D's share.

$\$47$ whole gain.

$\$4700 \times \frac{1}{7} = \1200 , S's stock,

$\$4700 \times \frac{1}{7} = \1500 , C's stock,

$\$4700 \times \frac{2}{7} = \2000 , D's stock,

} Ans.

(7.)

$$\begin{array}{l} \$4000 \times 5 = \$20000 \quad \frac{1}{17} = P's \text{ share of the gain.} \\ \$6000 \times 8 = \$48000 \quad \frac{8}{17} = H's \text{ share.} \\ \hline \$68000 \end{array}$$

$$\begin{array}{l} \$680 \times \frac{1}{17} = \$200, P's \text{ gain, } \\ \$680 \times \frac{8}{17} = \$480, H's \text{ gain, } \end{array} \left. \begin{array}{l} \text{Ans.} \\ \text{Ans.} \end{array} \right\}$$

(8.)

$$\begin{array}{l} \$300 \times 7 = \$2100 \quad \frac{1}{5} = A's \text{ part.} \\ \$500 \times 8 = \$4000 \quad \frac{8}{5} = B's \text{ part.} \\ \$200 \times 12 = \$2400 \quad \frac{12}{5} = C's \text{ part.} \\ \hline \$8500 \end{array}$$

$$\begin{array}{l} \$85 \times \frac{1}{5} = \$21, A's \text{ gain, } \\ \$85 \times \frac{8}{5} = \$40, B's \text{ gain, } \\ \$85 \times \frac{12}{5} = \$24, C's \text{ gain, } \end{array} \left. \begin{array}{l} \text{Ans.} \\ \text{Ans.} \end{array} \right\}$$

(9.)

$$\begin{array}{l} \$10 \div 5 = \$2, A's \text{ gain in 1 mo.} \quad \frac{1}{5} = A's \text{ part of stock.} \\ \$12 \div 4 = \$3, B's \text{ gain in 1 mo.} \quad \frac{3}{4} = B's \text{ part.} \\ \$5 \end{array}$$

$$\begin{array}{l} \$500 \times \frac{2}{5} = \$200, A's \text{ stock, } \\ \$500 \times \frac{3}{5} = \$300, B's \text{ stock, } \end{array} \left. \begin{array}{l} \text{Ans.} \\ \text{Ans.} \end{array} \right\}$$

(10.)

$$\begin{array}{l} \$3000 \times 6 = \$18000 \quad \$6000 \times 8 = \$48000 \\ \$2000 \qquad \qquad \qquad \$3000 \\ \hline \$5000 \times 6 = \$30000 \quad \$3000 \times 4 = \$12000 \\ \hline \$48000, A. \qquad \qquad \qquad \$60000, B. \end{array}$$

$$\begin{array}{l} \$48000 \qquad \frac{48000}{108000} = \frac{4}{9}, A's \text{ share.} \\ 60000 \qquad \qquad \qquad \frac{60000}{108000} = \frac{5}{9}, B's \text{ share.} \\ \hline \$108000 \end{array}$$

$$\begin{array}{l} \$1080 \times \frac{4}{9} = \$480, A's \text{ gain, } \\ \$1080 \times \frac{5}{9} = \$600, B's \text{ gain, } \end{array} \left. \begin{array}{l} \text{Ans.} \\ \text{Ans.} \end{array} \right\}$$

$$(11.) \quad \begin{array}{ll} 5 \times 4 = 20 & \frac{20}{150} = \frac{2}{15}, A. \\ 6 \times 8 = 48 & \frac{48}{150} = \frac{8}{25}, B. \\ 8 \times 5 = 40 & \frac{40}{150} = \frac{4}{15}, C. \\ 3 \times 14 = \underline{42} & \frac{42}{150} = \frac{7}{25}, D. \\ & 150 \end{array}$$

$$\left. \begin{array}{l} \$50 \times \frac{2}{15} = \$6.66\frac{2}{3}, A's \text{ share,} \\ \$50 \times \frac{8}{25} = \$16.00, B's \text{ share,} \\ \$50 \times \frac{4}{15} = \$13.33\frac{1}{3}, C's \text{ share,} \\ \$50 \times \frac{7}{25} = \$14.00, D's \text{ share,} \end{array} \right\} \text{Ans.}$$

$$(12.) \quad \begin{array}{ll} 30 \times 50 = 1500 & \frac{1500}{197} = \frac{50}{65}, A. \\ 50 \times 36 = 1800 & \frac{1800}{197} = \frac{60}{65}, B. \\ 58 \times 45 = \underline{2610} & \frac{2610}{197} = \frac{87}{65}, C. \\ & 5910 \end{array}$$

$$\$7500 - \$112.50 = \$7387.50.$$

$$\left. \begin{array}{l} \$7387.50 \times \frac{50}{65} = \$1875, A \text{ receives,} \\ \$7387.50 \times \frac{60}{65} = \$2250, B \text{ receives,} \\ \$7387.50 \times \frac{87}{65} = \$3262.50 + \$112.50 = \$3375, C \text{ receives,} \end{array} \right\} \text{Ans.}$$

PROFIT AND LOSS.

3. (Art. 255, p. 253.) $\$5.40 \times 40 = \216 , price paid;
 $40 \times \frac{3}{4} = 30$; $\$6.00 \times 30 = \180 ; $40 \times \frac{1}{4} = 10$;
 $\$7 \times 10 = \70 ; $\$180 + \$70 = \$250$, price sold at;
 $\$216 : \$250 :: \$100 : \$115\frac{2}{3}$; $\$115\frac{2}{3} - \100
 $= \$15\frac{2}{3} = 15\frac{2}{3}\%$ per cent., Ans.
4. $\$5 \times 50 = \250 , price paid; $\$5.98 \div 1.04 = \5.75 ,
present worth of $\$5.98$ due 8 months hence; $\$5.75 \times 50 = \287.50 , price sold at; $\$250 : \$287.50 :: \$100 : \115 ;
 $\$115 - \$100 = \$15 = 15$ per cent., Ans.
5. $100 \times \$0.30 = \30 , price paid; $100 - 30 = 70$; $70 \times \$0.40 = \28 , price sold at; $\$30 : \$28 :: \$100 : \$93\frac{1}{3}$;
 $\$100 - \$93\frac{1}{3} = \$6\frac{2}{3} = 6\frac{2}{3}\%$ per cent., Ans.

6. $3000 \times \$12\frac{1}{2} = \3375 , price paid; $3000 \times \$0.05 = \150 , cost of transportation; $\$3375 + \$150 = \$3525$, whole cost; $3000 \times \$1.37\frac{1}{2} = \4125 , price sold at; $\$3525 : \$4125 :: \$100 : \$117\frac{1}{4}$; $\$117\frac{1}{4} - \$100 = \$17\frac{1}{4} = 17\frac{1}{4}\%$ per cent., Ans.

7. $7\frac{3}{4}\text{rd.} = \frac{31}{4}\text{rd.}; \frac{31}{4} \times \frac{9}{11} = \frac{84}{121}\text{rd.}$, contents of the lot;

$$\frac{84}{121} \times \$5 = \$\frac{420}{121}, \text{ price paid}; \frac{1600}{6400} \text{ rd.} \times \frac{9}{\frac{1089}{4}} = 14400\text{ft.}; 14400 \times \$0.05 = \$720 = \$\frac{720}{121}; \$\frac{720}{121} : \$\frac{190}{121} : \$272\frac{1}{4}; \$272\frac{1}{4} - \$100 = \$172\frac{1}{4} = 172\frac{1}{4}\% \text{ per cent., Ans.}$$

3. (ART. 256, p. 254.) $120 \times \$0.30 = \36.00 , price paid; $\$100 : \$90 :: \$36.00 : \32.40 Ans.

4. $7\text{cwt. } 3\text{qr. } 12\text{lb.} = 880\text{lb.}; \$100 : \$120 :: \$88 : \$105.60$, $\$105.60 \div 880 = \0.12 per pound, Ans.

5. $\$100 : \$112 :: \$1728 : \1935.36 ; $\$1935.36 \times 1.04 = \$2012.77+$, worth of $\$1935.36$, 8 months hence, Ans.

6. $\$100 : \$110 :: \$4.00 : \4.40 , price sold at; $32\text{gal.} - 8\text{gal.} = 24\text{gal.}; \$4.40 \div 24 = \$0.18\frac{1}{3}$, price per gallon, Ans.

7. $\$90 \div 1.03 = \$87.37+$, present worth of $\$90$, due 6 months hence; $\$100 : \$120 :: \$87.37+ : \$104.84+$, Ans.

8. $\$11.50 \times 7 = \80.50 ; $\$100 : \$85 :: \$80.50 : \$68.42+$, Ans.

3. (ART. 257, p. 255.) $\$100 - \$62.50 = \$37.50$; $\$37.50 : \$100 :: \$80 : \$213.33\frac{1}{3}$, Ans.

4. $\$100 + \$20 = \$120$; $\$120 : \$100 :: \$7.20 : \6.00 per cord, Ans.

5. $\$100 + \$18 = \$118$; $\$118 : \$100 :: \$1600.00 : \$1355.93+$, Ans.

6. $\$8 \times 17 = \136 ; $\$136 \times .0155 = \2.108 , discount of $\$136$ for 3 months; $\$136 - \$2.108 = \$133.89+$

present worth of \$ 136, due 3 months hence; \$ 100 — \$ 10 = \$ 90; \$ 90 : \$ 900 :: \$ 133.89+ : \$ 148.76+,
Ans.

2. (ART. 258, p. 256.) \$ 100 + \$ 12 = \$ 112; \$ 112 : \$ 100 :: \$ 0.28 : \$ 0.25; \$ 0.25 : \$ 0.24 :: \$ 100 : \$ 96;
\$ 100 — \$ 96 = \$ 4 = 4 per cent. loss, Ans.
3. \$ 100 — \$ 25 = \$ 75; \$ 37.50 : \$ 75 :: \$ 75 : \$ 150;
\$ 150 — \$ 100 = \$ 50 = 50 per cent. gain, Ans.
4. \$ 1728 ÷ 1.045 = \$ 1653.58+, present worth of \$ 1728,
due 9 months hence; \$ 1653.58+ : \$ 2000 :: \$ 110 :
\$ 133+; \$ 133+ — \$ 100 = \$ 33+ = 33+ per cent.
gain, Ans.

MISCELLANEOUS EXERCISES.

1. (p. 257.) \$ 84.00 : \$ 75.60 :: \$ 100 : \$ 90; \$ 100 — \$ 90 = \$ 10 = 10 per cent. loss, Ans.
2. \$ 100 — \$ 10 = \$ 90; \$ 75.60 : \$ 97.44 :: \$ 90 : \$ 116;
\$ 116 — \$ 100 = \$ 16 = 16 per cent. loss, Ans.
3. \$ 100 + \$ 16 = \$ 116; \$ 97.44 : \$ 75.60 :: \$ 116 : \$ 90;
\$ 100 — \$ 90 = \$ 10 = 10 per cent. loss, Ans. \$ 116 :
\$ 100 :: \$ 97.44 : \$ 84, real value of the horse; \$ 84 —
\$ 75.60 = \$ 8.40, actual loss, Ans.
4. \$ 5 ÷ \$ 1.045 = \$ 4.78+, present worth of \$ 5, due 9
months hence; \$ 100 + \$ 12 = \$ 112; \$ 100 : \$ 112 :: \$ 4.78+ : \$ 5.35+, Ans.
5. \$ 100 + \$ 10 = \$ 110; \$ 100 : \$ 110 :: \$ 40 : \$ 44, price
sold at; 120gal. — 20gal. = 100gal.; \$ 44.00 ÷ 100 =
\$ 0.44 per gallon, Ans.
6. \$ 5 : \$ 7.50 :: \$ 100 : \$ 150; \$ 150 — \$ 100 = \$ 50 =
50 per cent., Jones's gain; \$ 0.10 : \$ 0.14 :: \$ 100 :
\$ 140; \$ 140 — \$ 100 = \$ 40 = 40 per cent., Crosby's
gain; 50 — 40 = 10 per cent., Jones's gain more than
Crosby's, Ans.
7. \$ 0.30 × 40 = \$ 12.00; 30 cents on the dollar = $\frac{3}{100}$ of
the sum to be paid; \$ 12.00 × $\frac{3}{100}$ = \$ 3.60, price

- received for 40gal. ; 160gal. — 40gal. = 120gal. ;
 $\$0.35 \times 120 = \42.00 , price received for 120gal. ;
 $\$42.00 + \$3.60 = \$45.60$; price received for 160gal. ;
 $\$100 + \$10 = \$110$; $\$110 : \$100 :: 45.60 : \$41.45+$, Ans.
8. $\$100 - \$10 = \$90$; $\$90 : \$100 :: \$75.60 : \84.00 ,
real value of the horse; $\$100 + \$16 = \$116$;
 $\$100 : \$116 :: \$84 : \97.44 , received for the horse;
 $\$75.60 : \$97.44 :: \$100 : \$128\frac{2}{3}$; $\$128\frac{2}{3} - \$100 = \$28\frac{2}{3} = 28\frac{2}{3}$ per cent. gained, Ans.
9. $1\frac{3}{4}\text{yd.} = 1.75$; 5 per cent. = $\frac{1}{20}$; $1\frac{3}{4} - \frac{1}{20} = \frac{35}{40}$;
 $1.75\text{yd.} \times \frac{35}{40} = 1.6625\text{yd.}$, width after shrinking;
 $70\text{yd.} \times \frac{35}{40} = 66.5\text{yd.}$, length after shrinking; $66.5\text{yd.} \times 1.6625 = 110.55+$ square yards after shrinking; $\$4.50 \times 70 = \315.00 , price paid; $\$100 + \$12 = \$112$;
 $\$100 : \$112 :: \$315.00 : \352.80 , price sold at;
 $\$352.80 \div 110.55+ = \$3.19+$, price per sq. yd., Ans.
-

DUODECIMALS.

(ART. 260, p. 258.)

| (1.) | (2.) | (3.) | (4.) |
|---------------|-------------------|----------------|---------------------|
| ft. 12 6 9 | ft. 182 11 2 4 | ft. 204 7 9 | ft. 397 9 6 11 7 |
| " 14 7 8 | " 127 7 8 11 | " 114 10 6 | " 201 11 7 8 10 |
| 165 11 10 | 291 5 11 10 | 89 9 3 | 195 9 11 2 9 |
| 193 2 3 | 602 0 11 1 | | |

(ART. 262, p. 260.)

| (2.) | (3.) | (4.) |
|------------|-------------|----------------|
| ft. 8 3 | ft. 12 9 | ft. 14 9 11 |
| " 7 9 | " 9 11 | " 6 11 8 |
| 57 9 | 114 9 | 88 11 6 |
| 6 2 3 | 11 8 3 | 13 7 1 1 |
| 63 11 3 | 126 5 3 | 9 10 7 4 |
| 10 | | 103 4 5 8 4 |

| (5.) | | |
|-------|----|---|
| ft. | ' | " |
| 161 | 8 | 6 |
| 7 | 10 | |
| <hr/> | | |
| 1131 | 11 | 6 |
| 134 | 9 | 1 |
| <hr/> | | |
| 1266 | 8 | 7 |

| (6.) | | |
|-------|----|----|
| ft. | ' | " |
| 87 | 1 | 11 |
| 5 | 7 | 5 |
| <hr/> | | |
| 435 | 9 | 7 |
| 50 | 10 | 1 |
| 3 | 0 | 3 |
| <hr/> | | |
| 489 | 8 | 0 |
| | 2 | 7 |

| (7.) | | |
|-------|---|----|
| ft. | ' | " |
| 18 | 1 | 10 |
| <hr/> | | |
| 18 | | |
| 15 | | 0 |
| <hr/> | | |
| 33 | | 0 |

| (8.) | | |
|-------|-----|---|
| ft. | in. | |
| 19 | 8 | |
| 2 | 11 | |
| <hr/> | | |
| 39 | 4 | |
| 18 | 0 | 4 |
| <hr/> | | |
| 57 | 4 | 4 |

| (9.) | | |
|-------|-----|---|
| ft. | in. | |
| 18 | 9 | |
| 10 | 6 | |
| <hr/> | | |
| 187 | 6 | |
| 9 | 4 | 6 |
| <hr/> | | |
| 196 | 10 | 6 |

| (10.) | | |
|-------|-----|---|
| ft. | in. | |
| 14 | 9 | |
| 12 | 6 | |
| <hr/> | | |
| 27 | 3 | |
| 2 | | |
| <hr/> | | |
| 177 | 0 | |
| 7 | 4 | 6 |
| <hr/> | | |
| 381 | 6 | |
| 40 | 10 | 6 |
| <hr/> | | |
| 422 | 4 | 6 |
| <hr/> | | |
| 791 | 1 | 6 |

[Ans.]

| ft. | in. |
|-------|-----|
| 3 | 8 |
| 1 | 9 |
| <hr/> | |
| 3 | 8 |
| 2 | 9 |
| <hr/> | |
| 6 | 5 |
| 2 | |
| <hr/> | |
| 12 | 10 |
| 7 | 4 |
| <hr/> | |
| 3 | 2 |
| <hr/> | |
| 23 | 4 |
| 12 | |
| <hr/> | |
| 280 | 0 |

Ans.

| (11.) | | |
|-------|-----|---|
| ft. | in. | |
| 1 | 2 | |
| <hr/> | | |
| 1 | 0 | |
| <hr/> | | |
| 3 | 8 | |
| 3 | 0 | |
| <hr/> | | |
| 2 | 8 | |
| <hr/> | | |
| 3 | 8 | |
| <hr/> | | |
| 3 | 2 | |
| <hr/> | | |
| 7 | 4 | |
| <hr/> | | |
| 5 | 6 | |
| 12 | | |
| <hr/> | | |
| 66 | 6 | 0 |

[66 ft. 864 in.]

| | (12.) | (13.) |
|-----------------------------------|---|---|
| rods. | ft. | ft. |
| 18 | 924 | 56 |
| 10 | $3\frac{1}{2} \times 4 = 14$ | 5 |
| <u>—</u> | <u>—</u> | <u>6</u> |
| 28 | 938 | 280 |
| 2 | 4 | 28 |
| <u>—</u> | <u>—</u> | <u>—</u> |
| 56 | 3752 | 32) 308 (9 $\frac{1}{2}$ cords, Ans. |
| <u>16\frac{1}{2}</u> | <u>3\frac{1}{2}</u> | <u>288</u> |
| <u>—</u> | <u>—</u> | <u>—</u> |
| 336 | 11256 | 20 |
| 56 | 1876 | |
| <u>—</u> | <u>—</u> | <u>(14.)</u> |
| 28 | 13132 | ft. in. |
| <u>—</u> | <u>—</u> | <u>23 8</u> |
| 924 | 5592 | |
| <u>4 \times 2 = 8</u> | <u>Ans. 7540</u> | <u>3 9</u> |
| <u>—</u> | <u>—</u> | <u>71 0</u> |
| 932 | | |
| 3 | | 17 9 |
| <u>—</u> | <u>(15.)</u> | <u>—</u> |
| 2796 | ft. | 32) 88 9 (2 $\frac{9}{12\frac{1}{2}}$ cords, Ans. |
| <u>2</u> | 97 | 12 64 |
| <u>—</u> | <u>7</u> | <u>384 24</u> |
| 5592 | | |
| <u>—</u> | <u>679</u> | <u>12</u> |
| | 3 8 | |
| <u>—</u> | <u>2037</u> | <u>3) 297</u> |
| | 452 | <u>= 12\frac{1}{2}</u> |
| | 8 | |
| <u>—</u> | <u>—</u> | <u>384</u> |
| 128) 2489 | 8 (19 cords 3 $\frac{3}{4}\frac{1}{2}$ ft. Ans. | |
| 128 | | (17.) |
| 1209 | ft. ft. in. ft. in. ft. | |
| 1152 | 12 6 6 5 6 12 | |
| <u>—</u> | <u>11 2 6 3 6 11</u> | |
| 16) 57 (3 | | |
| 12 48 | 23 13 0 16 6 23 | |
| <u>—</u> | <u>2 3 3 2 9 2</u> | |
| 192 9 | | |
| 192 9 | 46 16 3 19 3 46 | |
| (16.) 12 | 7 $\frac{1}{2}$ 2 3 5 | |
| ft. in. | | |
| 3 9 | 322 32 6 57 9 41 0 | |
| 8 | 23 32 6 8 | |
| <u>—</u> | <u>27 4 27 4</u> | |
| 30 0 | 9) 345 | |
| 30) 128 (4 $\frac{4}{5}$ ft. Ans. | 38 $\frac{1}{2}$ | 9) 117 7 |
| 120 | 13 $\frac{7}{10\frac{1}{2}}$ | 13 $\frac{7}{10\frac{1}{2}}$ |
| <u>—</u> | <u>—</u> | <u>—</u> |
| 8 | 25 $\frac{2}{5}$ yd. Ans. | |

INVOLUTION.

(ART. 264, p. 262.)

- | | |
|---|---|
| 1. $6 \times 6 = 36$ Ans. | 6. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ Ans. |
| 2. $5 \times 5 \times 5 = 125$ Ans. [Ans. | 7. $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{16}{243}$ Ans. $\frac{16}{243} = 662\frac{19}{243}$ Ans. |
| 3. $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4096$ | |
| 4. $3 \times 3 \times 3 \times 3 = 81$ Ans. | 8. $.25 \times .25 \times .25 = .015625$ |
| 5. $\frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}$ Ans. | 9. 17. Ans. [Ans. |
2. (ART. 265, p. 263.) $5, 25, 125; 125 \times 25 \times 25 = 78125$
3. $6, 36, 216; 216 \times 216 \times 216 = 10077696$ Ans. [Ans.
4. $7, 49, 343, 2401; 2401 \times 343 \times 343 \times 49 = 13841287201$
5. $8, 64, 512; 512 \times 512 \times 64 = 16777216$ Ans. [Ans.
6. $4, 16, 64, 256, 1024; 1024 \times 1024 = 1048576 \times 1048576$
 $= 1099511627776$ Ans. •
7. $3, 9, 27, 81, 243, 729, 2187, 6561, 19683, 59049, 59049$
 $+ 59049 + 59049 = 205891132094649$ Ans.
8. $2, 4, 8, 16, 32, 64, 128, 256, 512, 1024; 1024 \times 1024 \times 1024$
 $= 1125899906842624$ Ans.

EXTRACTION OF THE SQUARE ROOT.

(ART. 268, p. 267.)

| (3.) | (4.) | (5.) |
|------------|------------|---------------|
| 516961(719 | 182329(427 | 23804641(4879 |
| 49 | 16 | 16 |
| 141)269 | 82)223 | 88)780 |
| 141 | 164 | 704 |
| 1429)12861 | 847)5929 | 967)7646 |
| 12861 | 5929 | 6769 |
| | | 9749)87741 |
| | | 87741 |

| (6.) | (7.) | (8.) |
|--|--|---|
| $\begin{array}{r} 10673289 \\ - 9 \\ \hline 10672289 \end{array}$ | $\begin{array}{r} 20894041 \\ - 16 \\ \hline 20893925 \end{array}$ | $\begin{array}{r} 42025 \\ - 4 \\ \hline 41980 \end{array}$ |
| $\begin{array}{r} 3267 \\ \times 62 \\ \hline 167 \\ 124 \\ \hline 62 \end{array}$ | $\begin{array}{r} 489 \\ - 425 \\ \hline 64 \end{array}$ | $\begin{array}{r} 2025 \\ - 2025 \\ \hline 0 \end{array}$ |
| $\begin{array}{r} 4332 \\ - 3876 \\ \hline 466 \end{array}$ | $\begin{array}{r} 6440 \\ - 6349 \\ \hline 91 \end{array}$ | |
| $\begin{array}{r} 45689 \\ - 45689 \\ \hline 0 \end{array}$ | $\begin{array}{r} 9141 \\ - 9141 \\ \hline 0 \end{array}$ | |
| (9.) | (10.) | (11.) |
| $\begin{array}{r} 1014049 \\ - 1 \\ \hline 1014048 \end{array}$ | $\begin{array}{r} 538(23.194+ \\ - 4 \\ \hline 534 \end{array}$ | $\begin{array}{r} 71(8.426+ \\ - 64 \\ \hline 7 \end{array}$ |
| $\begin{array}{r} 0104049 \\ - 0104049 \\ \hline 0 \end{array}$ | $\begin{array}{r} 138 \\ - 129 \\ \hline 9 \end{array}$ | $\begin{array}{r} 164)700 \\ - 656 \\ \hline 44 \end{array}$ |
| | $\begin{array}{r} 900 \\ - 461 \\ \hline 439 \end{array}$ | $\begin{array}{r} 1682)4400 \\ - 3364 \\ \hline 4 \end{array}$ |
| (12.) | | |
| $\begin{array}{r} 7(2.645+ \\ - 4 \\ \hline 2.641 \end{array}$ | $\begin{array}{r} 43900 \\ - 41661 \\ \hline 223900 \end{array}$ | $\begin{array}{r} 16846)103600 \\ - 101076 \\ \hline 2524 \end{array}$ |
| $\begin{array}{r} 46)300 \\ - 276 \\ \hline 24 \end{array}$ | $\begin{array}{r} 185536 \\ - 38364 \\ \hline 147 \end{array}$ | |
| $\begin{array}{r} 524)2400 \\ - 2096 \\ \hline 304 \end{array}$ | $\begin{array}{r} (13.) \\ .1024(.32 \\ - 9 \\ \hline 124 \end{array}$ | $\begin{array}{r} (14.) \\ .3364(.58 \\ - 25 \\ \hline 864 \end{array}$ |
| $\begin{array}{r} 5285)30400 \\ - 26425 \\ \hline 3975 \end{array}$ | $\begin{array}{r} 124 \\ - 124 \\ \hline 0 \end{array}$ | |
| (15.) | | (16.) |
| $\begin{array}{r} .8950(.946+ \\ - 81 \\ \hline 84 \end{array}$ | | $\begin{array}{r} .120409(.347 \\ - 9 \\ \hline 304 \end{array}$ |
| $\begin{array}{r} 184)850 \\ - 736 \\ \hline 114 \end{array}$ | | $\begin{array}{r} 256 \\ - 256 \\ \hline 0 \end{array}$ |
| $\begin{array}{r} 1886)11400 \\ - 11316 \\ \hline 84 \end{array}$ | $\begin{array}{r} 4809 \\ - 4809 \\ \hline 0 \end{array}$ | |

(17.)

$$\begin{array}{r}
 6\dot{1}723020.96(7856.4 \\
 49 \\
 \hline
 148)1272 \\
 1184 \\
 \hline
 1565)8830 \\
 7825 \\
 \hline
 15706)100520 \\
 94236 \\
 \hline
 157124)628496 \\
 628496 \\
 \hline
 \end{array}$$

(18.)

$$\begin{array}{r}
 9\dot{7}54.60423716(98.7654 \\
 81 \\
 \hline
 188)1654 \\
 1504 \\
 \hline
 1967)15060 \\
 13769 \\
 \hline
 19746)129142 \\
 118476 \\
 \hline
 197525)1066637 \\
 987625 \\
 \hline
 1975304)7901216 \\
 7901216 \\
 \hline
 \end{array}$$

(ART. 269, p. 267.)

$$\begin{array}{cccc}
 (1.) & (2.) & (3.) & (4.) \\
 \checkmark \frac{4}{5} & \checkmark \frac{1}{2} & \checkmark \frac{7}{5} & \checkmark \frac{1}{2} \\
 49(7) & 196(14) & 3721(61) & 1849(43) \\
 49 & 1 & 36 & 16 \\
 \hline
 24)96 & 121)121 & 121 & 83)249 \\
 96 & 121 & 121 & 249 \\
 \hline
 529(23) & & & 12769(113) \\
 4 & 625(25) & 7569(87) & 1 \\
 \hline
 43)129 & 4 & 64 & 21 \\
 129 & 45)225 & 167)1169 & 223)669 \\
 \hline
 2\frac{1}{3} \text{ Ans.} & 225 & 1169 & 669 \\
 & \frac{1}{2} \text{ Ans.} & \frac{6}{7} \text{ Ans.} & \frac{1}{13} \text{ Ans.} \\
 \hline
 \end{array}$$

(5.)

$$\begin{array}{r}
 60\frac{1}{16} = \frac{961}{16} \\
 961(31) \\
 9 \\
 \hline
 61)61 \\
 61 \\
 \hline
 16(4) \\
 16 \\
 \hline
 \end{array}$$

(6.)

$$\begin{array}{r}
 28\frac{1}{4} = 1\frac{84}{4} \\
 1849(43) \\
 16 \\
 \hline
 83)249 \\
 249 \\
 \hline
 64(8) \\
 64 \\
 \hline
 \end{array}$$

(7.)

$$\begin{array}{r}
 47\frac{1}{4} = 3\frac{87}{4} \\
 3025(55) \\
 25 \\
 \hline
 105)525 \\
 525 \\
 \hline
 64(8) \\
 64 \\
 \hline
 \end{array}$$

 $\frac{31}{4} = 7\frac{3}{4}$ Ans. $\frac{4}{3} = 5\frac{3}{8}$ Ans. $\frac{5}{8} = 6\frac{1}{8}$ Ans.

$$(8.) \quad \begin{array}{r} .736842 + (.858 + \\ \frac{64}{165) 968} \\ \underline{825} \\ 1708) 14342 \\ \underline{13664} \\ 678 \end{array}$$

$$(9.) \quad \begin{array}{r} .83 = 83.6666 + (9.14 + \\ \frac{81}{181) 266} \\ \underline{181} \\ 1824) 8566 \\ \underline{7296} \\ 1270 \end{array}$$

$$(10.) \quad \begin{array}{r} 121\frac{1}{4} = 121.94444 + (11.042 + \\ \frac{1}{21) 21} \\ \underline{21} \\ 2204) 9444 \\ \underline{8816} \\ 22082) 62844 \\ \underline{44164} \\ 18680 \end{array}$$

$$(11.) \quad \frac{339\frac{3}{4}}{462} = \frac{337\frac{1}{4}}{462} = \frac{38}{49}; \sqrt{\frac{38}{49}} = \frac{2}{7} \text{ Ans.}$$

$$(12.) \quad \frac{76\frac{3}{4}}{1557\frac{1}{3}} = \frac{10000}{15250} = \frac{4}{5}; \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}} \text{ Ans.}$$

APPLICATION OF THE SQUARE ROOT.

(ART. 270, p. 268.)

1. $\sqrt{226576} = 476$ Ans.
2. 640 acres = 102400 rods; $\sqrt{102400} = 320$ rods, Ans.
3. $125 \times 53 = 6625$ rd.; $62\frac{1}{2} \times 34 = 2125$ rd.; $37 \times 160 = 5920$ rd.; $6625 + 2125 + 5920 = 14670$ rd.; $\sqrt{14670} = 121.11+$ rods, Ans.
4. $242 \times 242 = 58564$ feet, area of the first lot; $58564 \times 9 = 527076$. $\sqrt{527076} = 726$ feet, Ans.

5. $124A. \times 160 = 19840$ rods, area of the former pasture;
 $4 : 5 :: 19840 : 24800$, area of the latter; $\sqrt{24800} = 157.48+$ rd., Ans.
6. $2 : 3 :: 216 : 324$; $\sqrt{324} = 18$ trees in length; $3 : 2 :: 216 : 144$; $\sqrt{144} = 12$ trees in breadth; $18 - 1 = 17$; $17 \times 25 = 425$ ft.; $12 - 1 = 11$; $11 \times 25 = 275$ ft.; $425 \times 275 = 116875$ sq. ft., Ans.
1. (Art. 275, p. 269.) $40 \times 40 = 1600$; $9 \times 9 = 81$;
 $1600 + 81 = 1681$; $\sqrt{1681} = 41$ ft., Ans.
2. $360 \times 360 = 129600$; $450 \times 450 = 202500$; $129600 + 202500 = 332100$; $\sqrt{332100} = 576.2+$ miles, Ans.
3. $60 \times 60 = 3600$ ft.; $36 \times 36 = 1296$ ft.; $3600 - 1296 = 2304$ ft.; $\sqrt{2304} = 48$ feet, Ans.
4. $120 \times 120 = 14400$ ft.; $50 \times 50 = 2500$ ft.; $14400 - 2500 = 11900$ ft.; $\sqrt{11900} = 109.08+$ feet, Ans.
5. $160 + 20 = 180$; $180 \times 180 = 32400$; $500 \times 500 = 250000$; $250000 - 32400 = 217600$; $\sqrt{217600} = 466.47+$; $466.47+ - 100 = 366.47+$ feet, Ans.
6. $110 + 90 = 200$; $300 \times 300 = 90000$; $200 \times 200 = 40000$; $90000 - 40000 = 50000$; $\sqrt{50000} = 223.6+$ ft.; $223.6+ - 160 = 63.6+$ feet, Ans.
7. $60 \times 60 = 3600$; $80 \times 80 = 6400$; $3600 + 6400 = 10000$; $\sqrt{10000} = 100$; $70 \times 70 = 4900$; $4900 + 6400 = 11300$; $\sqrt{11300} = 106.30+$; $90 \times 90 = 8100$; $8100 + 4900 = 13000$; $\sqrt{13000} = 114.01+$; $8100 + 3600 = 11700$; $\sqrt{11700} = 108.16+$; $100 + 106.30 + 114.01 + 108.16 = 428.47+$ rods, Ans.
8. $24 \times 24 = 576$ ft.; $18 \times 18 = 324$ ft.; $576 + 324 = 900$ ft.; $12 \times 12 = 144$; $900 + 144 = 1044$ ft.; $\sqrt{1044} = 32.3+$ feet, Ans.
2. (Art. 279, p. 271.) $16 : 8 :: 16^2 : 128$; $\sqrt{128} = 11.31+$ feet, Ans.

3. $11 : 33 :: 11^2 : 363$; $\sqrt{363} = 19.05+$ rods, Ans.
 4. $28.3 : 42.5 :: 6^2 : 54.06+$; $\sqrt{54.06+} = 7.35+$ feet,
 Ans.
 5. $2000 : 4000 :: 3^2 : 18$; $\sqrt{18} = 4.24+$ inches, Ans.
 6. $1000 : 5000 :: 4^2 : 80$; $\sqrt{80} = 8.94+$ inches, Ans.
 7. $12^2 : 8^2 :: 72 : 32$ rods, Ans.
 8. $45^2 : 15^2 :: 950 : 105.55+$ square rods, Ans.
 9. $6^2 : 9^2 :: 1.178+ : 2.65+$ feet, Ans.
 10. $3^2 : 2^2 :: 20\frac{1}{4} : 9$ minutes, Ans.
 11. $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$; $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$; $\frac{9}{16} - \frac{1}{16} = \frac{8}{16} = \frac{1}{2}$; $\frac{1}{16} : \frac{1}{16} :: 50 : 62\frac{1}{2}$ minutes, Ans.
1. (Art. 280, p. 272.) $12^2 = 144$; $144 \div 2 = 72$; $\sqrt{72} = 8.48+$ feet, Ans.
 2. $30^2 = 900$; $900 \div 2 = 450$; $\sqrt{450} = 21.2+$ inches
 square, Ans.
 3. $1.5 \times 1.5 = 2.25$; $2.25 \div 2 = 1.1250$; $\sqrt{1.1250} = 1.06+$ inches, Ans.
-

EXTRACTION OF THE CUBE ROOT.

(Art. 282, p. 276.)

| (2.) | (3.) |
|---|---|
| $\overline{74088}(42)$ | $\overline{185193}(57)$ |
| 64 | 125 |
| $4^2 \times 300 = 4800) \underline{\overline{10088}}$ | $5^2 \times 300 = 7500) \underline{\overline{60193}}$ |
| $4800 \times 2 = 9600$ | $7500 \times 7 = 52500$ |
| $2^2 \times 30 \times 4 = 480$ | $7^2 \times 30 \times 5 = 7350$ |
| $2 \times 2 \times 2 = \underline{\overline{8}}$ | $7 \times 7 \times 7 = \underline{\overline{343}}$ |
| 10088 | 60193 |

$$\begin{array}{rcl}
 (4.) & & (5.) \\
 80621568(432) & & 176558481(561) \\
 64 & & 125 \\
 \hline
 4^2 \times 300 = 4800) \underline{16621} & & 5^2 \times 300 = 7500) \underline{51558}
 \end{array}$$

$$\begin{array}{rcl}
 4800 \times 3 = 14400 & & 7500 \times 6 = 45000 \\
 3^2 \times 30 \times 4 = 1080 & & 6^2 \times 30 \times 5 = 5400 \\
 3 \times 3 \times 3 = \underline{27} & & 6 \times 6 \times 6 = \underline{216} \\
 \hline
 15507 & & 50616 \\
 \hline
 43^2 \times 300 = 554700) \underline{1114568} & & 56^2 \times 300 = 940800) \underline{942481}
 \end{array}$$

$$\begin{array}{rcl}
 554700 \times 2 = 1109400 & & 940800 \times 1 = 940800 \\
 2^2 \times 30 \times 43 = 5160 & & 1^2 \times 30 \times 56 = 1680 \\
 2 \times 2 \times 2 = \underline{8} & & 1 \times 1 \times 1 = \underline{1} \\
 \hline
 1114568 & & 942481
 \end{array}$$

$$\begin{array}{rcl}
 (6.) & & (7.) \\
 257259456(636 & & 1860867(123 \\
 216 & & 1 \\
 \hline
 6^2 \times 300 = 10800) \underline{41259} & & 1^2 \times 300 = 300) \underline{860}
 \end{array}$$

$$\begin{array}{rcl}
 10800 \times 3 = 32400 & & 300 \times 2 = 600 \\
 3^2 \times 30 \times 6 = 1620 & & 2^2 \times 30 \times 1 = 120 \\
 3 \times 3 \times 3 = \underline{27} & & 2 \times 2 \times 2 = \underline{8} \\
 \hline
 34047 & & 728 \\
 \hline
 63^2 \times 300 = 1190700) \underline{7212456} & & 12^2 \times 300 = 43200) \underline{132867}
 \end{array}$$

$$\begin{array}{rcl}
 1190700 \times 6 = 7144200 & & 43200 \times 3 = 129600 \\
 6^2 \times 30 \times 63 = 68040 & & 3^2 \times 30 \times 12 = 3240 \\
 6 \times 6 \times 6 = \underline{216} & & 3 \times 3 \times 3 = \underline{27} \\
 \hline
 7212456 & & 132867
 \end{array}$$

(8.)

$$\begin{array}{r} 1879080904(1234 \\ \underline{1} \\ 1^2 \times 300 = 300) \underline{879} \end{array}$$

$$\begin{array}{r} 300 \times 2 = 600 \\ 2^2 \times 30 \times 1 = 120 \\ 2 \times 2 \times 2 = \underline{\quad 8} \\ \underline{728} \\ 12^2 \times 300 = 43200) \underline{151080} \end{array}$$

$$\begin{array}{r} 43200 \times 3 = 129600 \\ 3^2 \times 30 \times 12 = \quad 3240 \\ 3 \times 3 \times 3 = \underline{\quad 27} \\ \underline{132867} \\ 123^2 \times 300 = 4538700) \underline{18213904} \end{array}$$

$$\begin{array}{r} 4538700 \times 4 = 18154800 \\ 4^2 \times 30 \times 123 = \quad 59040 \\ 4 \times 4 \times 4 = \underline{\quad 64} \\ \underline{18213904} \end{array}$$

(9.)

$$\begin{array}{r} 41673648.563(346.7 \\ \underline{27} \\ 3^2 \times 300 = 2700) \underline{14673} \end{array}$$

$$\begin{array}{r} 2700 \times 4 = 10800 \\ 4^2 \times 30 \times 3 = \quad 1440 \\ 4 \times 4 \times 4 = \underline{\quad 64} \\ \underline{12304} \\ 34^2 \times 300 = 346800) \underline{2369648} \\ (\text{Carried forward.}) \end{array}$$

(Brought forward.)

$$34^2 \times 300 = 346800) \underline{2369648}$$

$$346800 \times 6 = 2080800$$

$$6^2 \times 30 \times 34 = 36720$$

$$6 \times 6 \times 6 = \underline{\underline{216}}$$

$$\underline{2117736}$$

$$346^2 \times 300 = 35914800) \underline{251912563}$$

$$35914800 \times 7 = 251403600$$

$$7^2 \times 30 \times 346 = 508620$$

$$7 \times 7 \times 7 = \underline{\underline{343}}$$

$$\underline{251912563}$$

(10.)

$$483921.516051(78.51$$

$$\underline{\underline{343}}$$

$$7^2 \times 300 = 14700) \underline{140921}$$

$$14700 \times 8 = 117600$$

$$8^2 \times 30 \times 7 = 13440$$

$$8 \times 8 \times 8 = \underline{\underline{512}}$$

$$\underline{131552}$$

$$78^2 \times 300 = 1825200) \underline{9369516}$$

$$1825200 \times 5 = 9126000$$

$$5^2 \times 30 \times 78 = 58500$$

$$5 \times 5 \times 5 = \underline{\underline{125}}$$

$$\underline{9184625}$$

$$785^2 \times 300 = 184867500) \underline{184891051}$$

$$184867500 \times 1 = 184867500$$

$$1^2 \times 30 \times 785 = 23550$$

$$1 \times 1 \times 1 = \underline{\underline{1}}$$

$$\underline{184891051}$$

(11.)

$$\begin{array}{r} 8.144865728(2.012 \\ \underline{8} \end{array}$$

$$20^2 \times 300 = 120000) \underline{144865}$$

$$\begin{array}{r} 120000 \times 1 = 120000 \\ 1^2 \times 30 \times 20 = 600 \\ 1 \times 1 \times 1 = \underline{1} \\ \hline 120601 \end{array}$$

$$201^2 \times 300 = 12120300) \underline{24264728}$$

$$\begin{array}{r} 12120300 \times 2 = 24240600 \\ 2^2 \times 30 \times 201 = 24120 \\ 2 \times 2 \times 2 = \underline{8} \\ \hline 24264728 \end{array}$$

(12.)

(13.)

$$\begin{array}{r} .075686967(.423 \\ \underline{64} \end{array}$$

$$\begin{array}{r} 25(2.92+ \\ \underline{8} \end{array}$$

$$4^2 \times 300 = 4800) \underline{11686}$$

$$2^2 \times 300 = 1200) \underline{17000}$$

$$\begin{array}{r} 4800 \times 2 = 9600 \\ 2^2 \times 30 \times 4 = 480 \\ 2 \times 2 \times 2 = \underline{8} \\ \hline 10088 \end{array}$$

$$\begin{array}{r} 1200 \times 9 = 10800 \\ 9^2 \times 30 \times 2 = 4860 \\ 9 \times 9 \times 9 = \underline{729} \\ \hline 16389 \end{array}$$

$$42^2 \times 300 = 529200) \underline{1598967}$$

$$29^2 \times 300 = 252300) \underline{611000}$$

$$\begin{array}{r} 529200 \times 3 = 1587600 \\ 3^2 \times 30 \times 42 = 11340 \\ 3 \times 3 \times 3 = \underline{27} \\ \hline 1598967 \end{array}$$

$$\begin{array}{r} 252300 \times 2 = 504600 \\ 2^2 \times 30 \times 29 = 3480 \\ 2 \times 2 \times 2 = \underline{8} \\ \hline 508088 \\ \hline 102912 \end{array}$$

(ART. 282, p. 277.)

(1.)

$$\begin{array}{rcl} 81\frac{5}{11} & = & 81.454545454(4.334+ \\ & & \underline{64} \\ 4^2 \times 300 = 4800) & \underline{17454} \end{array}$$

$$\begin{array}{rcl} 4800 \times 3 & = & 14400 \\ 3^2 \times 30 \times 4 & = & 1080 \\ 3 \times 3 \times 3 & = & \underline{\underline{27}} \\ & & 15507 \end{array}$$

$$43^2 \times 300 = 554700) \underline{1947545}$$

$$\begin{array}{rcl} 554700 \times 3 & = & 1664100 \\ 3^2 \times 30 \times 43 & = & 11610 \\ 3 \times 3 \times 3 & = & \underline{\underline{27}} \\ & & 1675737 \end{array}$$

$$433^2 \times 300 = 56246700) \underline{271808454}$$

$$\begin{array}{rcl} 56246700 \times 4 & = & 224986800 \\ 4^2 \times 30 \times 433 & = & 255840 \\ 4 \times 4 \times 4 & = & \underline{\underline{64}} \\ & & 225242704 \\ & & 46565750 \end{array}$$

(2.)

$$3\sqrt[3]{4096} = \frac{8}{16} \text{ Ans.}$$

$$\begin{array}{r} 729(9) \\ \underline{729} \\ 1 \end{array} \quad \begin{array}{r} 4096(16) \\ \underline{4096} \\ 1 \end{array}$$

$$1^2 \times 300 = 300) \underline{3096}$$

(3.)

$$49\frac{8}{27} = \frac{1331}{27};$$

$$3\sqrt[3]{\frac{1331}{27}} = \frac{11}{3} = 3\frac{2}{3} \text{ Ans.}$$

$$\begin{array}{r} 1331(11) \\ \underline{1331} \\ 1 \end{array} \quad \begin{array}{r} 27(3) \\ \underline{27} \end{array}$$

$$1^2 \times 300 = 300) \underline{331}$$

$$\begin{array}{rcl} 300 \times 6 & = & 1800 \\ 6^2 \times 30 \times 1 & = & 1080 \\ 6 \times 6 \times 6 & = & \underline{\underline{216}} \\ & & 3096 \end{array}$$

$$\begin{array}{rcl} 300 \times 1 & = & 300 \\ 1^2 \times 30 \times 1 & = & 30 \\ 1 \times 1 \times 1 & = & \underline{\underline{1}} \\ & & 331 \end{array}$$

$$\begin{array}{ll}
 \text{(4.)} & \text{(5.)} \\
 166\frac{3}{8} = 1331; & 85\frac{23}{125} = 10648; \\
 3\sqrt{1331} = 11 = 5\frac{1}{2} \text{ Ans.} & 3\sqrt{10648} = 22 = 4\frac{2}{3} \text{ Ans.} \\
 \\
 \begin{array}{r} 1331(11 \\ 1 \quad \quad 8 \\ \hline 331) \end{array} & \begin{array}{r} 8(2 \\ 8 \\ \hline 1648(22 \\ 8 \\ \hline 2648) \end{array} \\
 1^3 \times 300 = 300) \overline{331} & 2^3 \times 300 = 1200) \overline{2648} \\
 \\
 \begin{array}{r} 300 \times 1 = 300 \\ 1^3 \times 30 \times 1 = 30 \\ 1 \times 1 \times 1 = 1 \\ \hline 331 \end{array} & \begin{array}{r} 1200 \times 2 = 2400 \\ 2^3 \times 30 \times 2 = 240 \\ 2 \times 2 \times 2 = 8 \\ \hline 2648 \end{array} \\
 & \begin{array}{r} 125(5 \\ 125 \\ \hline \end{array}
 \end{array}$$

1. (ART. 283, p. 277.) $3\sqrt{2744} = 14$ feet, Ans.
 2. $268\frac{4}{5} \times 8 = 2150\frac{4}{5}$ cubic inches in 1 gallon ; $2150\frac{4}{5} \times 400 = 860160$ cubic inches $= 497\frac{1}{5}$ cubic feet in 400 bushels ; $3\sqrt{497.777} + \text{ft.} = 7.92 + \text{ft.}$, Ans.
 3. $18 \times 15 \times 10 = 2700 \text{ ft.} ; 3\sqrt{2700} \text{ ft.} = 13.92 + \text{ft.}$, Ans.
 2. (ART. 288, p. 278.) $2^3 = 8 : 12^3 = 1728 :: \$ 6.25$
\\$ 1350 Ans.
 3. $4^3 = 64 : 6^3 = 216 :: 50 : 168.7 + \text{lb.}$, Ans.
 4. $16 : 8 :: 12^3 = 1728 : 864 ; 3\sqrt{864} = 9.5 + ; 12 - 9.5 + = 2.5 + \text{in.}$, Ans.
 5. $6^3 = 216 : 7^3 = 343 :: 800 : 1270.3 + \text{lb.}$, Ans.
 6. $1^3 : 2^3 = 8 :: 1 : 8$ cords, Ans.
 7. $30^3 = 27000 : 40^3 = 64000 :: 1000 : 2370.3 + \text{lb.}$, Ans.
 8. $6^3 = 216 : 12^3 = 1728 :: 16 : 128$ ounces, Ans.
 9. $15^3 = 3375 ; 3375 \times \frac{1}{8} = 2250 ; 3\sqrt{2250} = 13.1 +$ feet,
Ans.
-

ARITHMETICAL PROGRESSION.

2. (ART. 290, p. 280.) $\frac{55 - 7}{17 - 1} = 3$ Ans.
3. $\frac{14 - 4}{15 - 1} = \frac{10}{14} = \frac{5}{7}$ Ans. | 4. $\frac{17 - 9}{10 - 1} = \frac{8}{9}$ miles, Ans.

2. (ART. 291, p. 281.) $\overline{\$51 + \$7} \times 6 = \$348$ Ans.

3. $\frac{198 \times 99}{2} = 9801$ rods, Ans.

2. (ART. 292, p. 282.) $\frac{\overline{47 - 8}}{3} + 1 = 14$ days, Ans.

(ART. 293, p. 283.)

2. $\frac{\overline{137 - 12}}{5} + 1 = 26$; $\frac{\overline{137 + 12} \times 26}{2} = 1937$ lines, Ans.

2. (ART. 294, p. 284.) $\overline{12 - 1} \times 2 + 7 = 29$ miles, Ans.

3. $\overline{10 - 1} \times 1\frac{1}{2} = 13\frac{1}{2}$; $20\frac{1}{4} - 13\frac{1}{2} = 6\frac{3}{4}$ miles, Ans.

2. (ART. 296, p. 285.) $(\overline{6 - 1}) \times \$15 + \$250 = \325 ;
 $\overline{250 + 325} \times 3 = \1725 Ans.

3. $(\overline{10 - 1}) \times \$19 + \$380 = \551 ; $\overline{551 + 380} \times 5 = \4655 Ans.

4. $(\overline{8 - 1}) \times \$49.50 + \$825 = \1171.50 ; $\overline{1171.50 + 825} \times 4 = \7986 Ans.

5. $(\overline{6 - 1}) \times \$8 + \$200 = \240 ; $\overline{240 + 200} \times 3 = \1320 Ans.

6. $(\overline{8 - 1}) \times \$42 + \$700 = \994 ; $\overline{994 + 700} \times 4 = \6776 ; $\overline{\$6776 - \$100} = \$6676$ Ans.

7. $(\overline{12 - 1}) \times \$0.50 + \$50 = \55.50 ; $\overline{55.50 + 50} \times 6 = \633 Ans.

GEOMETRICAL PROGRESSION.

2. (ART. 298, p. 287.) $5^6 = 15625$; $15625 \times 4 = 62500$ Ans.

3. $\frac{1}{4}^6 = \frac{1}{4096}$; $\frac{1}{4096} \times 28672 = \frac{28672}{4096} = 7$ Ans.

4. $4^7 = 16384$; $16384 \times 5 = 81920$ Ans.

5. $20^4 = 160000$; $160000 \times 10 = 1600000$ Ans. [Ans.

6. $1.06^5 = 1.3382255776$; $1.3382255776 \times 30 = 40.146767328$

7. $1.06^6 = 1.3382255776$; $1.3382255776 \times \$1728 = \$2312.453798+$ Ans. [Ans.]
 8. $1.05^4 = 1.21550625$; $1.21550625 \times \$328.90 = \$399.78+$
 9. $3^{14} = 4782969$; $4782969 \times \$0.05 = \239148.45 Ans.

3. (ART. 299, p. 289.) $\frac{4^7 - 1}{4 - 1} \times 8 = 43688$ Ans.

4. $\frac{1 - \frac{3^5}{4}}{1 - \frac{3}{4}} \times 10 = \frac{1819}{256} = 30\frac{19}{256}$ Ans.

5. $\frac{1.06^4 - 1}{1.06 - 1} \times 18 = 78.743+$ Ans.

6. $\frac{1.05^6 - 1}{1.05 - 1} \times \$144 = \$795.6909$ Ans.

7. $1\frac{3}{4} = \frac{7}{4}; \frac{\frac{7}{4}^6 - 1}{\frac{7}{4} - 1} = \frac{1449}{64} = \$91\frac{9}{64}$ Ans.

8. $\frac{4^{10} - 1}{4 - 1} \times \$0.01 = \$3495.25$ Ans.

2. (ART. 301, p. 291.) $\frac{1.05^4 - 1}{1.05 - 1} \times \$1728 = \$7447.89,6+$ [Ans.]

3. $\frac{1.06^7 - 1}{1.06 - 1} \times \$87 = \$730.26,3+$ Ans.

4. $\frac{1.06^8 - 1}{1.06 - 1} \times \$500 = \$3487.65,9+$ Ans.

5. $\frac{1.06^{10} - 1}{1.06 - 1} \times \$96 = \$1265.35,6+$ Ans.

6. $\frac{1.06^8 - 1}{1.06 - 1} \times \$1000 = \$3183.60$ Ans.

7. $\frac{1.06^9 - 1}{1.06 - 1} \times \$56 = \$470.05,4+$ Ans.

8. $\frac{1.05^7 - 1}{1.05 - 1} \times \$25 = \$203.55; \frac{1.06^{10} - 1}{1.06 - 1} \times \$20 = \$263.61,5+$; $\$263.61,5 - \$203.55 = \$60.06,5+$, William receives more than Samuel, Ans.

9. $\frac{1.05^{14} - 1}{1.05 - 1} \times \$10 = \$195.98,6+$ Ans.

ALLIGATION.

(2.) (ART. 304, p. 292.)

$$\begin{array}{ll}
 \$0.20 \times 30 = \$6.00 & \$0.40 \times 4 = \$1.60 \\
 \$0.25 \times 40 = \$10.00 & \$0.85 \times 8 = \$6.80 \\
 \$0.30 \times 70 = \$21.00 & \$1.00 \times 12 = \$12.00 \\
 \$0.40 \times 80 = \$32.00 & \$1.50 \times 10 = \$15.00 \\
 \hline
 220\text{gal. } \$69.00 & 34\text{bu. } \$35.40 \\
 \$69 \div 220 = \$0.31\frac{1}{11} \text{ Ans.} & \$35.40 \div 34 = \$1.04\frac{2}{17} \text{ Ans.}
 \end{array}$$

(4.)

$$\begin{array}{ll}
 \$0.10 \times 30 = \$3.00 & \\
 \$0.12 \times 25 = \$3.00 & \\
 \$0.15 \times 4 = \$0.60 & \\
 \$0.20 \times 50 = \$10.00 & \\
 \hline
 109\text{lb. } \$16.60 &
 \end{array}$$

$$\$16.60 \div 109 = \$0.15\frac{2}{17} \text{ Ans.}$$

(ART. 306, p. 294.)

(3.)

$$42 \left\{ \begin{array}{r} 25 \\ 30 \\ 40 \\ \hline 50 \end{array} \right. \begin{array}{l} 8 \\ 8 \\ 8 \\ \hline 17 \end{array} \left. \begin{array}{r} 8 \\ 8 \\ 8 \\ \hline 31 \end{array} \right\} \text{Ans.}$$

(4.)

$$18 \left\{ \begin{array}{r} 12 \\ 15 \\ 20 \\ \hline \end{array} \right. \begin{array}{l} 2 \\ 2 \\ 6 + 3 = 9 \\ \hline \end{array} \left. \begin{array}{r} 2 \\ 2 \\ 9 \\ \hline \end{array} \right\} \text{Ans.}$$

(ART. 307, p. 295.)

(2.)

$$1.25 \left\{ \begin{array}{r} 50 \\ 60 \\ 1.50 \\ 1.70 \\ \hline 75 \end{array} \right. \begin{array}{l} 45 \\ 25 \\ 65 \\ \hline \end{array} \left. \begin{array}{l} 75 : 45 :: 30 : 18\text{bu. of oats,} \\ 75 : 25 :: 30 : 10\text{bu. of peas,} \\ 75 : 65 :: 30 : 26\text{bu. of beans,} \\ \hline \end{array} \right\} \text{Ans.}$$

(3.)

$$\begin{aligned}
 .10 \times 1.25 &= .12\frac{1}{4} \\
 .12 \times 1.25 &= .15 \\
 .15 \times 1.25 &= .18\frac{3}{4}
 \end{aligned}$$

$$14 \left\{ \begin{array}{r} 12\frac{1}{2} \\ 15 \\ 18\frac{3}{4} \\ \hline \end{array} \right. \begin{array}{l} 1 + 4\frac{3}{4} = 5\frac{3}{4} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \\ \hline \end{array} \left. \begin{array}{l} 1\frac{1}{2} : 5\frac{3}{4} :: 100 : 383\frac{1}{4}\text{lb.} \\ 1\frac{1}{2} : 1\frac{1}{2} :: 100 : 100\text{lb.} \\ \hline \end{array} \right\} \text{Ans.}$$

(ART. 308, p. 296.)

(2.)

$$1.80 \left\{ \begin{array}{r} 0.00 \\ 2.00 \\ 2.50 \end{array} \right| \begin{array}{r} .70 + .20 = .90 \\ 1.80 \\ 1.80 \\ \hline 4.50 \end{array}$$

$$\begin{aligned} 4.50 : .90 &:: 100 : 20 \text{ bushels of chaff,} \\ 4.50 : 1.80 &:: 100 : 40 \text{ bushels of wheat,} \\ 4.50 : 1.80 &:: 100 : 40 \text{ bushels of rye,} \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Ans.}$$

(3.)

$$\begin{aligned} .20 \times 1.10 &= .22 & 25 \left\{ \begin{array}{r} 22 \\ 33 \end{array} \right| \begin{array}{r} 8 \\ 3 \end{array} \quad \begin{array}{r} 11 : 8 :: 80 : 58 \\ 11 : 3 :: 80 : 21 \end{array} \text{ gal.} \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{Ans.}$$

 $\frac{11}{11}$

(4.)

$$12 \left\{ \begin{array}{r} 10 \\ 15 \end{array} \right| \begin{array}{r} 3 \\ 2 \end{array} \quad \begin{array}{r} 5 : 3 :: 60 : 36 \text{ thousand,} \\ 5 : 2 :: 60 : 24 \text{ thousand,} \end{array} \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{Ans.}$$

PERMUTATION.

2. (ART. 310, p. 297.) $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 = 362880$ days = 994 years, 70 days, Ans.
 3. $12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 479001600$;
 1 to 479001600 Ans.
 4. $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$ words, Ans.

MENSURATION OF SURFACES.

1. (ART. 314, p. 299.) $18 \div 2 = 9$; $24 \times 9 = 216$ ft. Ans.
 2. $50 + 60 + 70 = 180$; $180 \div 2 = 90$; $90 - 50 = 40$;
 $90 - 60 = 30$; $90 - 70 = 20$; $90 \times 40 \times 30 \times 20 = 2160000$; $\sqrt{2160000} = 1469.69+$ rods, Ans.
 1. (ART. 317, p. 300.) $25 \times 3 = 75$ feet, Ans.
 2. $37 \times 27 = 999$ ft. ; $40 \times 20 = 800$ ft. ; $999 - 800 = 199$ ft.
 3. $15 \times 12 = 180$ ft. Ans. [Ans.]

1. (Art. 319, p. 301.) $482 + 324 = 806$ ft.; $806 \div 2 = 403$;
 $403 \times 216 = 87048$ square feet, Ans.
2. $28 + 20 = 48$ in.; $48 \div 2 = 24$ in. = 2 ft.; $2 \times 22 = 44$
square feet, Ans.
1. (Art. 321, p. 301.) $65 \times \frac{14}{2} = 455$; $65 \times \frac{18}{2} = 585$;
 $455 + 585 = 1040$ square feet, Ans.
2. $125 \times \frac{19}{2} = 4375$; $125 \times \frac{85}{2} = 5312.5$; $4375 + 5312.5 = 9687.5$ square rods, Ans.
1. (Art. 324, p. 302.) $35 \times 5 = 175$; $175 \times \frac{24.08}{2} = 2107$
square feet, Ans.
2. $20 \times 6 = 120$; $120 \times \frac{17.32}{2} = 1039.20$ square feet, Ans.
1. (Art. 326, p. 302.) $3.141592 \times 50 = 157.0796+$ ft. Ans.
2. $3.141592 \times 100 = 314.15+$ rods, Ans.
1. (Art. 327, p. 302.) $.318309 \times 80 = 25.46+$ miles, Ans.
2. $.318309 \times 62.84 = 20+$ feet, Ans.
1. (Art. 328, p. 303.) $200 \times 200 \times .785398 = 31415.92$
square feet, Ans.
2. $400 \times 400 \times 0.079577 = 12732+$ p. = 79 A. 2 R. 12+p. Ans.
1. (Art. 329, p. 303.) $40 \times .886227 = 35.44+$ rods, Ans.
2. $100 \times .282094 = 28.2+$ rods, Ans.
1. (Art. 330, p. 304.) $30 \times .707106 = 21.21+$ inches, Ans.
2. $100 \times .225079 = 22.5+$ rods square, Ans. [Ans.]
1. (Art. 332, p. 304.) $14 \times 10 \times .785398 = 109.95+$ sq. in.
2. $8 \times 5 \times .785398 = 31.415+$ ft. = 31 sq. ft. 59 sq. in. Ans.

MENSURATION OF SOLIDS.

1. (Art. 335, p. 305.) $3 \times 3 = 9$; $9 \times 15 = 135$; $3 + 3 + 3 = 9 \div 2 = 4.5$; $4.5 - 3 = 1.5$; $1.5 \times 1.5 \times 1.5 \times 4.5 = 15.1975$; $\sqrt{15.1975} = 3.895+$; $3.895 \times 2 = 7.79+$; $135 + 7.79+ = 142.79+$ square feet, Ans.

2. $9 \times 4 = 36$; $36 \times 25 = 900$; $9 \times 9 = 81$; $81 \times 2 = 162$;
 $900 + 162 = 1062$ square feet, Ans.

1. (ART. 336, p. 306.) $5 + 4 + 3 = 12$; $12 \div 2 = 6$; $6 - 5 = 1$; $6 - 4 = 2$; $6 - 3 = 3$; $1 \times 2 \times 3 \times 6 = 36$;
 $\sqrt{36} = 6$; $20 \times 6 = 120$ cubic feet, Ans.

2. $8 \times 8 \times 8 = 512$ cubic feet, Ans.

3. $30 \times 20 \times 10 = 6000$ cubic feet, Ans.

1. (ART. 338, p. 306.) $3 \times 4 = 12$; $3 \times 3 \times .079577 = .716+$; $.716 \times 2 = 1.43+$; $12 + 1.43+ = 13.43$
square feet, Ans.

2. $2 \times 3.141592 = 6.283184$; $6.283184 \times 12 = 75.39$ sq. ft.
[Ans.]

1. (ART. 339, p. 306.) $2 \times 2 \times .785398 = 3.141592$; $3.141592 \times 8 = 25.13+$ cubic feet, Ans.

2. $5 \times 5 \times .785398 = 19.63495$; $19.63495 \times 20 = 392.69$ ft.
[Ans.]

1. (ART. 342, p. 307.) $100\text{ft.} = 1200\text{in.}$; $54\text{ft.} = 648\text{in.}$;
 $1200 \div 2 = 600$; $648 \times 600 = 388800$; $388800 \div 27 = 14400\text{in.} = 400$ yards, Ans.

2. $50 \div 2 = 25$; $25 \times 12 = 300$ square feet, Ans.

1. (ART. 343, p. 307.) $693 \times 693 = 480249$; $480249 \times 500 = 240124500$; $240124500 \div 3 = 80,041,500$ cubic feet;
 $80,041,500 \div 8 = 10,005,187.5$ feet; $10,005,187.5 \div 5280 = 1894.9$ miles, Ans.

2. $5 \times 5 \times .785398 = 19.6349$; $19.6349 \times 30 = 589.04$;
 $589.04 \div 3 = 196.3$ feet, Ans.

1. (ART. 346, p. 308.) $8 \times 4 = 32$; $4 \times 4 = 16$; $32 + 16 = 48$; $48 \times 20 = 960$; $960 \div 2 = 480$; $8 \times 8 = 64$;
 $4 \times 4 = 16$; $64 + 16 = 80$; $480 + 80 = 560$ sq. ft. Ans.

2. $18 + 9 = 27$; $27 \times 12 = 324$; $324 \div 2 = 162$; $18 \times 18 \times .079577 = 25.78+$; $9 \times 9 \times .079577 = 6.44+$;
 $25.78 + 6.44 = 32.22+$; $162 + 32.22+ = 194.22+$
square feet, Ans.

1. (ART. 347, p. 308.) $20 \times 20 = 400$; $10 \times 10 = 100$;
 $400 \times 100 = 40000$; $\sqrt{40000} = 200$; $200 + 400 + 100 = 700$; $700 \times 30 = 21000$; $21000 \div 3 = 7000$
cubic feet, Ans.
 2. $12 \times 12 \times .785398 = 113.097+$; $6 \times 6 \times .785398 = 28.274$;
 $113.097 \times 28.274 = 3197.704578$; $\sqrt{3197.704578} = 56.548+$; $56.548 + 113.097 + 28.274 = 197.919+$ in.
 $= 1.3744+$ ft.; $1.3744+ \times 20 = 27.488+$; $27.488+ \div 3 = 9.162+$ feet, Ans.
 1. (ART. 349, p. 309.) $3.141592 \times 20 = 62.83+$; $62.83+ \times 20 = 1256.6+$ square inches, Ans.
 2. $3.141592 \times 8000 = 25132.736$; $25132.736 \times 8000 = 201061888$ square miles, Ans.
 1. (ART. 350, p. 309.) $20 \times 20 \times 20 \times .523598 = 4188.7+$ inches, Ans.
 2. $5 \times 5 \times 5 \times .523598 = 65.44+$ cubic feet, Ans.
 1. (ART. 351, p. 309.) $10 \times 10 = 100$; $100 \div 3 = 33.33+$;
 $\sqrt{33.33+} = 5.773+$ inches, Ans. [Ans.]
 2. $30 \times 30 = 900$; $900 \div 3 = 300$; $\sqrt{300} = 17.32+$ feet,
 1. (ART. 353, p. 310.) $20 \times 20 \times 30 \times .523598 = 6283.17+$
cubic feet, Ans.
 2. $30 \times 30 \times 10 \times .523598 = 4712.38+$ cubic feet, Ans.
-

MENSURATION OF LUMBER AND TIMBER.

1. (ART. 355, p. 310.) $16 \times 18 = 288$ in.; 288 in. $\div 12 = 24$ feet, Ans.
 2. $24 \times 30 = 720$ in.; 720 in. $\div 12 = 60$ feet, Ans.
 1. (ART. 356, p. 310.) $4 \times 3 \times 12 = 144$ in.; 144 in. $\div 12 = 12$ feet, Ans.
 2. $10 \times 10 \times 25 = 2500$ in.; $2500 \div 12 = 208\frac{1}{3}$ feet, Ans.
-

1. (Art. 357, p. 311.) $60 \div 4 = 15$; $15 \times 15 = 225$;
 $225 \times 50 = 11250$; $11250 \div 144 = 78\frac{1}{2}$ cubic ft., Ans.
 2. $30 \div 4 = 7.5$; $7.5 \times 7.5 \times 30 = 1687.50$; $1687.50 \div 144 = 11.7+$ solid feet, Ans.
-

MISCELLANEOUS EXAMPLES.

(PAGE 311.)

1. 100cts. : 10cts. :: 72d. : $7\frac{1}{2}$ d.; $7\frac{1}{2} - 7 = \frac{1}{2}$ d. Ans.
2. $7\frac{1}{2} = 7\frac{1}{2}$; $7\frac{1}{2} - \frac{1}{2} = 7\frac{1}{2}$ Ans.
3. $4\frac{1}{4} = 4\frac{7}{8}$; $3\frac{1}{2} = 3\frac{8}{8}$; $4\frac{7}{8} + 3\frac{8}{8} = 7\frac{15}{8}$ Ans.
4. $5\frac{3}{4} \times 5 = 27\frac{1}{4}$; $27\frac{1}{4} - 3\frac{3}{4} = 23\frac{1}{4}$ Ans.
5. $\frac{7}{11}\text{m.} = \frac{7}{11} \times \frac{1}{1} = \frac{7}{11} = 5\frac{1}{11}\text{fur.}; \frac{1}{11}\text{fur.} = \frac{1}{11} \times \frac{40}{1} = 3\frac{7}{11}\text{rd.}; \frac{7}{11}\text{rd.} = \frac{7}{11} \times \frac{32}{2} = \frac{224}{22} = 10\frac{4}{11}\text{ft.}; \frac{1}{2} \times \frac{12}{1} = \frac{12}{2} = 6\text{ in.}; \frac{1}{6}\text{fur.} = \frac{1}{6} \times \frac{40}{1} = \frac{40}{6} = 31\frac{1}{3}\text{rd.}; \frac{1}{6} \times \frac{32}{2} = \frac{32}{6} = 1\frac{1}{3}\text{ft.}; \frac{1}{3}\text{ft.} = \frac{1}{3} \times \frac{12}{1} = \frac{12}{3} = 4\text{ in.}$

| fur. | rd. | ft. | in. |
|------|-----|-----|-----|
| 5 | 3 | 10 | 6 |
| 31 | 1 | 10 | |

4 12 8 8 Ans.

6. $\frac{8}{11}\text{R.} = \frac{8}{11} \times \frac{40}{1} = \frac{320}{11} = 32\frac{8}{11}\text{p.}; \frac{8}{11}\text{p.} = \frac{8}{11} \times \frac{27\frac{1}{2}}{1} = \frac{217\frac{8}{11}}{11} = 198$ feet.

| A. | R. | p. | ft. | in. |
|----|----|----|--------------------|------------|
| 7 | 0 | 0 | 0 | 0 |
| | | | 32 | 198 |
| 6 | 3 | 7 | 74 $\frac{1}{2}$ | 0 |
| | | | $\frac{1}{4} = 36$ | |
| 6 | 3 | 7 | 74 | 36 Ans. |

7. $7 : 12 :: \frac{8}{11} : \frac{8}{11} = \frac{32}{11}\text{h.}$, time Swift will travel the distance;
 $5 : 12 :: \frac{7}{11} : \frac{7}{11}\text{h.}$, time Slow will travel the distance;
 $\frac{32}{11} - \frac{7}{11} = \frac{25}{11}\text{h.}; \frac{4}{11}\text{h.} \times \frac{60}{1} \times \frac{60}{1} = \frac{14400}{11} = 121\frac{9}{11}\text{sec.}$ Ans.

8. $\frac{1}{2}T = \frac{1}{2} \times \frac{20}{1} = \frac{10}{1}$ cwt; $\frac{10}{1}$ cwt : $\frac{1}{2}$ cwt :: \$49 : $\frac{10}{1}$
 $\times \frac{1}{2} \times \frac{4}{1} = \3.92 Ans.
9. $8 \times 4 \times 2 = 64$; $1728 \div 64 = 27$, number of bricks in a cubic foot; $40 \times 20 \times 2 = 1600$ cubic feet in the wall; $1600 \times 27 = 43200$ bricks, Ans.
10. $80 + 40 = 120$; $120 \times 2 = 240$ feet round the house; from this sum we deduct 4 feet for the corners; $240 - 4 = 236$; $236 \times 25 \times 27 = 159300$ bricks, Ans.
11. $18 \times 12 \times 144 = 31104$, number of square inches in the floor; $8 \times 8 = 64$ square inches in a tile; $31104 \div 64 = 486$ tiles, Ans.
12. $11\text{cwt. } 3\text{qr. } 19\text{lb.} = 1335\text{lb.}; 83\text{cwt. } 2\text{qr. } 11\text{lb.} = 9363\text{lb.};$
 $1335\text{lb.} : 9363\text{lb.} \left\{ \begin{array}{l} \\ 46\text{m.} : 96\text{m.} \end{array} \right\} :: \$18.25 : \$267.12_{2047}^{456}$
 $9363 \times 96 \times 18.25 = 16403976.00$; $1335 \times 46 = 61410$; $16403976 \div 61410 = \$267.12_{2047}^{456}$ Ans.
13. $\$100 - \$25 = \$75$; $\$75 : \$100 :: \$24 : 32$, value of the cloth; $\$34 - \$32 = \$2$; $\$32 : \$2 :: \$100 : \$6\frac{1}{4}$ Ans.
14. $120 - 20 = 100$ gallons remaining; $\$30 + \$10 = \$40$, price to be obtained; $100\text{gals.} : 1\text{gal.} :: \$40 : \$0.40$ Ans.
15. $117\frac{3}{4} = \frac{822}{4}$; $112\frac{2}{9} = \frac{1010}{9}$; $\frac{822}{4} \times \frac{1010}{9} = \frac{830220}{36} = 13178\frac{2}{3}$ rods = 82A. 1R. 18p. 2yd. 7ft. 133 $\frac{1}{2}$ in. Ans.
16. $\$128.25 \times 1.03 = \132.0975 ; $\$132.0975 \times 1.06 = \$140.02+$ Ans.
17. $27\text{bu.} : 36\text{bu.} :: \$8.75 : \$11.66+$ Ans.
18. $\$1.25 \times 93 = \116.25 ; $\$116.25 \div \$0.50 = 232\frac{1}{2}$ bushels, Ans. [Ans.]
19. $\$1.25 \times 75 = \93.75 ; $\$93.75 \div 1.30 = 72\frac{3}{5}$ bushels,
20. $\frac{1}{2}$ of 24h. = 8h.; $\frac{1}{2}$ of 24h. = 6h.; $8 + 6 + 2 + 6 = 22$ h.; 24h. — 22h. = 2 hours, Ans.
21. $\frac{1}{4}$ of 24h. = 6h.; $\frac{1}{2}$ of 24h. = $4\frac{1}{2}$ h.; $\frac{1}{6}$ of 24h. = 4h.; $\frac{1}{12}$ of 24h. = $3\frac{1}{2}$ h.; $6 + 4\frac{1}{2} + 4 + 3\frac{1}{2} + 2 = 20\frac{8}{5}$ h.; 24h. — $20\frac{8}{5}$ h. = $3\frac{7}{5}$ hours, Ans.

22. $7\frac{3}{5} = \frac{38}{5}$; $5\frac{1}{4} = \frac{21}{4}$; $\frac{38}{5} \times \frac{21}{4} = \frac{819}{10}$; 160rd. : $1\frac{819}{10}$ rd.

$$\therefore \$25.75 : \frac{1}{160} \times \frac{\frac{819}{10}}{\frac{45}{16}} = \frac{2575}{9} = \$6.65\frac{3}{4}$$

[Ans.]

(23.) $5\frac{3}{5}$ E.E. : $71\frac{3}{4}$ yd. :: \$15.16

$$\begin{array}{r} 5 \\ 28 \\ \hline 28 \\ 15.16 \\ \hline 1722 \\ 287 \\ \hline 1435 \\ 287 \\ \hline 28)4350.92 \end{array}$$

\$155.39 Ans.

24. $5\frac{3}{5}$ ft. : 4ft. :: 150ft. : $107\frac{1}{4}$ feet, Ans.

25. \$100 : \$150 :: 6m. : 9m. Ans.

26. $\$1.20 \times 150 = \180.00 , sum paid by the polls;
 $\$6045.50 - \$180.00 = \$5865.50$ to be paid on valuation;
 $\$293275 : \$5865.50 :: \$1.00 : \0.02 on a dollar;
 $\$1.00 : \$0.02 :: \$3675 : \73.50 ; $\$1.20 \times 4 = \4.80 ; $\$4.80 + \$73.50 = \$78.30$ Ans.

27. 2cwt. 3qr. 11lb. = 319lb.; $319\text{lb.} \times 97 = 30943\text{lb.}$
3£. 17s. 9d. = 933d.; 112lb. : 30943lb. :: 933d. :
 $257766\frac{27}{112}\text{d.} ; 257766\frac{27}{112}\text{d.} = 1074\text{£. } 0\text{s. } 6\frac{27}{112}\text{d.}$ Ans.

(28.)

| y. | mo. | d. | |
|------|-----|----|-----------------|
| 1842 | 9 | 29 | \$17.86 |
| 1840 | 1 | 9 | .1634 |
| | 2 | 8 | 20 |
| | | | 5358 |
| | | | 10716 |
| | | | 1786 |
| | | | 595 |
| | | | 29.1713 |
| | | | 74 |
| | | | 204.1991 |
| | | | 7.2928 |
| | | | 6)211.4919 |
| | | | Ans. \$35.24,76 |

(29.)

| y. | mo. | d. | |
|------|-----|----|------------------|
| 1842 | 8 | 25 | \$97.87 |
| 1840 | 0 | 7 | .163 |
| | 2 | 8 | 18 |
| | | | 29361 |
| | | | 58722 |
| | | | 9787 |
| | | | 15.95281 |
| | | | 9 |
| | | | 6)143.57529 |
| | | | Ans. \$23.92,921 |

30. $30 \times 30 = 900$; $900 \div 3 = 300$; $\sqrt{300} =$ length of one side of the cube; $\sqrt{300} \times \sqrt{300} \times 6 = 1800$ inches, Ans.

(31.)

Principal bearing interest from Oct. 29, 1836, . . . \$ 1000.00
Compound interest on \$ 1000 from Oct. 29, 1836,

to Oct. 29, 1842, 6 years, 418.51

Amount of principal to Oct. 29, 1842, 1418.51

First payment, Jan. 1, 1837, \$ 125.00

Compound interest from Jan. 1, 1837, to

Oct. 29, 1842, 5y. 9m. 28d., 50.58

Second payment, June 5, 1837, 316.00

Compound interest from June 5, 1837,

to Oct. 29, 1842, 5y. 4m. 24d., 117.02

Third payment, Sept. 25, 1837, 417.00

Compound interest from Sept. 25, 1837,

to Oct. 29, 1842, 5y. 1m. 4d., 144.20

Fourth payment, April 1, 1838, 100.00

Compound interest from April 1, 1838,

to Oct. 29, 1842, 4y. 6m. 28d., 30.62

Fifth payment, July 5, 1838, 50.00

Compound interest from July 5, 1838, to

Oct. 29, 1842, 4y. 3m. 24d., 14.30

Amount of indorsements, \$ 1364.72

Balance due Oct. 29, 1842, \$ 53.79

$$32. 23\frac{1}{4} = 16\frac{5}{8}; 16\frac{5}{8} = 13\frac{5}{8}; 13\frac{5}{8} \times 13\frac{5}{8} = 223\frac{3}{4}\text{ ft.}; 7\frac{5}{12} \times 2 = 14\frac{5}{6}; 388\frac{3}{4} - 14\frac{5}{6} = 374\frac{1}{2} = 7\frac{5}{12}\text{ ft.}; 223\frac{3}{4} - 14\frac{5}{6} = 209\frac{2}{3} = 14\frac{5}{6}\text{ ft.}; 14\frac{5}{6} \times 14\frac{5}{6} = 344\frac{25}{36} = 7822\frac{13}{36}\text{ ft. square feet} = 1A. 3R. 7p. 85\frac{25}{36}\text{ ft. Ans.}$$

33. $100 \times 80 = 8000$ square feet in the garden; $100 + 80 = 180$; $180 \times 2 = 360$ ft. To this we add 4 feet for each corner = 16 ft.; $360 + 16 = 376$ ft., length of the ditch; $376 \times 4 = 1504$ ft., superficial contents of the ditch; $8000 \div 1504 = 5\frac{1}{7}$ feet, depth of the ditch, Ans.

34. $15\frac{1}{2} \times 12 = 186$ in.; $11\frac{1}{4} \times 12 = 135$ in.; $7\frac{3}{4} \times 12 = 93$ in.; $186 + 135 = 321$; $321 \times 2 = 642$; $642 \times 93 = 59706$ square inches; $59706 \div 30 = 1990\frac{1}{3}$; $1990\frac{1}{3} \div 36 = 55\frac{7}{6}$ yd. Ans.
35. $15\frac{1}{2} + 11\frac{1}{4} = 26\frac{3}{4}$; $26\frac{3}{4} \times 2 = 53\frac{1}{2} = 10\frac{1}{2}$; $7\frac{3}{4} = \frac{31}{4}$; $\frac{10\frac{1}{2}}{4} \times \frac{31}{4} = \frac{331}{8}$; $15\frac{1}{4} = \frac{61}{4}$; $11\frac{1}{4} = \frac{45}{4}$; $\frac{45}{4} \times \frac{31}{4} = \frac{1395}{16}$; $\frac{331}{8} + \frac{1395}{16} = \frac{4712}{16} = 589$ square feet; $589 \div 9 = 65\frac{4}{9}$ square yards; $65\frac{4}{9} \times 10 = \$6.54\frac{4}{9}$ Ans.
36. $40 \times 40 = 1600$; $1600 \div 3 = 533.33\frac{1}{3}$; $\sqrt{533.33\frac{1}{3}} = 23.09401$; $533.33\frac{1}{3} \times 23.09401 = 12316.8+$ Ans.
37. $32 : 4 :: 18.5^3 : 791.453125$; $\sqrt[3]{791.453125} = 9.25 = 9\frac{1}{4}$ inches wide; $32 : 4 :: 8^3 : 64$; $\sqrt[3]{64} = 4$ inches deep, Ans.
38. As $\frac{1}{2}$ of the estate was given to the wife, $\frac{2}{3}$ of the estate will remain. The eldest son has $\frac{1}{4}$ of the $\frac{2}{3} = \frac{2}{12} = \frac{1}{6}$. The wife and son will therefore have $\frac{1}{2} + \frac{1}{6} = \frac{4}{6}$ of the estate. The daughter is to have $\frac{1}{3}$ of the residue; that is, $\frac{1}{3}$ of $\frac{1}{3} = \frac{1}{9}$. Therefore the wife, son, and daughter, will have $\frac{4}{6}$, $\frac{1}{6}$, and $\frac{1}{9} = \frac{7}{18}$; and $\frac{1}{2} - \frac{7}{18} = \frac{1}{9}$ will remain to be divided among the other heirs. But, if $\frac{1}{9}$, the daughter's portion, is $\$151.33\frac{1}{3}$, $\frac{1}{2}$, the residue, will be 5 times as much, that is, 5 times $\$151.33\frac{1}{3} = \$756.66\frac{2}{3}$ Ans.

OPERATION.

$$\frac{1}{9} : \frac{5}{18} :: \$151.33\frac{1}{3} : \$756.66\frac{2}{3} \text{ Ans.}$$

39. If the son receives $\frac{1}{4}$, there will remain $\frac{4}{4} - \frac{1}{4} = \frac{3}{4}$; and $\frac{1}{3}$ of $\frac{3}{4} = \frac{3}{12}$ will be the daughter's portion. The son and daughter will receive $\frac{1}{4} + \frac{3}{12} = \frac{6}{12} = \frac{1}{2}$ of the estate; there will therefore remain $\frac{4}{4} - \frac{1}{2} = \frac{1}{2}$ for the wife; and the son will receive $\frac{1}{2} - \frac{3}{12} = \frac{1}{4}$ more than the daughter; therefore, $\frac{1}{10} : \frac{1}{2} :: \$100 : \$600$, wife's portion, Ans.
40. $\$1250 - \$500 = \$750$, which was $\frac{3}{4}$ of his capital. He therefore lost $\$750 \div 3 = \250 Ans.
41. $\frac{1}{3}$ of $\frac{1}{2} = \frac{1}{6}$; $\frac{1}{2} - \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$ Ans.
42. $\$112.50 : \$100 :: \$50 : \$44.44\frac{2}{3}$ Ans.

43. 17cwt. 3qr. 18lb. = 2006lb. ; $2006 \times 7\frac{1}{2} = 15045$ d. ;
 15045 d. = 63£. 13s. 9d. = \$ 208.95 $\frac{3}{8}$ Ans.
44. \$ 5.00 : \$ 17.50 :: $\frac{2}{11}$ yd. : $\frac{3}{22}$ yd. Ans.
45. 17rd. 10ft. = 290 $\frac{1}{2}$ ft. ; $8\frac{1}{2} = \frac{17}{6}$ h. ; therefore, $\frac{7}{17}$ h. : $\frac{44}{6}$ h. ::
 $290\frac{1}{2}$ ft. : 6208 $\frac{1}{2}$ ft. = 1m. 928 $\frac{1}{2}$ ft. Ans.
46. \$ 11.75 : \$ 100 :: 2 $\frac{3}{4}$ A. : 1A. 1R. 32 $\frac{1}{2}$ p. Ans.
47. \$ 128 — \$ 70 = \$ 58 ; \$ 58 : \$ 70 :: \$ 1000 :
\$ 1206.89 $\frac{1}{2}$ Ans.
48. \$ 1.218 $\frac{1}{2}$: \$ 1.00 :: \$ 1000 : \$ 820.79 $\frac{3}{4}$ Ans.
49. \$ 97.57 — \$ 88 = \$ 9.57.
\$ 88 : \$ 100 } :: \$ 9.57 : \$ 7 $\frac{1}{2}$
18m. : 12m. }
- $\frac{\$ 9.57 \times 1000 \times 12}{18 \times 88} = \frac{11484}{1584} = 7\frac{1}{4}$ per cent., Ans.
50. $\frac{2}{3}$ gal. : $7\frac{1}{2}$ gal. :: \$ 87 = $\frac{2}{3} : \frac{31}{2} :: \frac{87}{1} = \frac{2}{3} \times \frac{31}{4} \times \frac{87}{1} =$
 $\frac{12618}{12} = \$ 1051.25$ Ans.
51. 18 $\frac{3}{4}$ yd. : 5yd. :: \$ 71 = $\frac{75}{4} : \frac{5}{} :: \frac{71}{1} = \frac{75}{4} \times \frac{1}{5} \times \frac{71}{1} =$
 $\frac{2475}{20} = \$ 19.26\frac{1}{2}$ Ans.
52. 18 tons 17cwt. 3qr. = 42308lb. ; 112lb. : 42308lb. :: \$ 9.50
: \$ 3588 $\frac{1}{2}$; \$ 4.00 : \$ 3588 $\frac{1}{2}$:: lyd. : 897 $\frac{1}{2}$ yd. Ans.
53. 1bu. : 98bu. :: \$ 0.45 : \$ 44.10 ; \$ 1.25 : \$ 44.10 :: 1bu. :
35 $\frac{7}{5}$ bu. Ans.
54. 86 tons 18cwt. 3qr. 20lb. = 194760lb. ; 2240lb. : 194760lb.
: : \$ 8.50 : \$ 739.04 $\frac{1}{2}$ = 19A. 2R. 33 $\frac{8}{5}$ p. Ans.
55. By the question, we find $\frac{1}{2}$ of the time passed from noon equal to $\frac{1}{12}$ of the time to midnight. We reduce these fractions to a common denominator, $\frac{1}{2}$ and $\frac{1}{12} = \frac{6}{12}$ and $\frac{7}{12}$. When fractions are reduced to a common denominator, their value is as their numerators. Therefore 11 will represent the time passed from noon, and 7 the time to midnight, and $11 + 7 = 18$ will represent 12 hours ; therefore 7 : 18 :: 12h. : 4h. 40m. time from noon, Ans.
56. $200 \times 4 \times 40 \times 272\frac{1}{4} \times 20 = 174,240,000$ feet, Ans.
57. $20000 \times 4 \times 40 \times 272\frac{1}{4} \times 144 \times 3 = 376358400000$
cubic inches ; $376358400000 \div 282 = 1334604255\frac{4}{14}\frac{5}{14}$

$$\text{gallons} ; 1334604255\frac{1}{4}\div 100 = 13346042 \text{ hhd. } 55 \text{ gal.} ;$$

$$1\frac{1}{4} \text{ gal.} = 1 \text{ qt. } 0 \text{ pt. } 2\frac{1}{2} \text{ qt. } \text{Ans.}$$

58. $1^\circ : 71^\circ 4' :: 4\text{min.} : 4\text{h. } 44\text{m. } 16\text{sec.}$

$$\begin{array}{r}
 h. \quad m. \quad sec. \\
 \hline
 11 & 16 & 0 \\
 4 & 44 & 16 \\
 \hline
 6 & 31 & 16
 \end{array}$$

Ans. 6 31 44

(59.)

$$1^\circ : \underline{85^\circ} \quad 45' :: 4m.$$

$$\begin{array}{r}
 60 \quad 5145 \\
 \underline{-} \qquad \qquad \qquad 4 \\
 60) \underline{20580} \\
 \underline{-} \qquad \qquad \qquad 60) 343
 \end{array}$$

2 36 A. M.

60)343m. 5 43

5h. 43m. 8 53 P. M. Ans.

(60.)

$$4\text{m.} : 24\text{m.} :: 1^\circ$$

$$\begin{array}{r} \frac{1}{4)24(6^{\circ})} \\ \underline{24} \end{array}$$

$$\begin{array}{r} 16 & 18 \text{ W.} \\ 6 & 0 \\ \hline 10 & 18 \text{ W.} \end{array}$$

NOTE. To perform this question we are obliged to add 12 hours to the minuend, and it brings the time to the evening of the previous day.

61. $3000 \times 5280 = 15840000$; $15840000 \div 1142 = 13870$ +
seconds; $13870 \div 60 = 231$ m. 10sec.; $231 \div 60 =$
3h. 51m.; 3h. 51m. 10+ sec. Ans.

$$62. \quad 1142 \times 10 = 11420; \quad 11420 \div 5280 = 2\text{m. } 860\text{ft. Ans.}$$

$$63. \quad 2^3 = 8 : 3^3 = 27 :: \$125.00 : \$421.87\frac{1}{4} \text{ Ans.}$$

64. $20 - 15 = 5 : 15 :: 10 : 30$ cents, Ans.

$$65. \quad 12\frac{1}{2} - 10 = 2\frac{1}{2}; \quad 10 : 2\frac{1}{2} :: 100 : 25 \text{ per cent.}; \quad 19 - 15 \\ = 4; \quad 15 : 4 :: 100 : 26\frac{2}{3} \text{ per cent.}; \quad 26\frac{2}{3} - 25 = 1\frac{2}{3} \\ \text{per cent., which Y makes more than Q.}$$

66. From Sept. 25 to Jan. 1 are 97 days = 139680 minutes.
From 23 minutes past 3 A. M. to midnight is 20h. 33m.

$= 1233$ minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 57 years $= 365 \times 57 \times 24 \times 60 = 29959200$ minutes. From Jan. 1, 1844, to July 4, 1844, are 185 days $= 185 \times 24 \times 60 = 266400$ minutes. From Jan. 1, 1787, to Jan. 1, 1844, are 13 leap years; we have, therefore, to add the number of minutes in 13 days, $13 \times 24 \times 60 = 18720$ minutes. To these we add the minutes from 30 minutes past 5 A. M. to midnight $= 1050$ min.

$$\begin{array}{r} 139680 \\ 1233 \\ \hline 29959200 \\ 266400 \\ 18720 \\ \hline 1050 \end{array}$$

NOTE. We have reckoned but 13 leap years from Jan. 1, 1787, to Jan. 1, 1844, because 1800 was not a leap year.

Ans. 30386283 minutes.

(67.)

| S. | ° | ' | " |
|----|----|----|----|
| 3 | 14 | 26 | 14 |
| 8 | 19 | 43 | 28 |

Ans. 6 24 42 46

NOTE. As the moon is east of the star, and is also moving eastward in her orbit, we must add 12 signs to the minuend.

(68.)

| A. | R. | p. | f. |
|----|----|----|-----|
| 3 | 1 | 23 | 200 |
| 1 | 2 | 37 | |

We first reduce the 200 feet in the minuend to yards and feet, $200 \div 9 = 22$ yd. 2 ft.

| A. | R. | p. | yd. | f. | in. |
|----|----|----|-------------------|----|-----|
| 3 | 1 | 23 | 22 | 2 | 0 |
| 1 | 2 | 37 | 30 | 8 | 0 |
| | | | | | |
| 1 | 2 | 25 | $21\frac{1}{4}$ | 3 | 0 |
| | | | $\frac{1}{4} = 2$ | 36 | |
| | | | | | |
| 1 | 2 | 25 | 21 | 5 | 36 |

$$\frac{6}{5} \div \frac{3}{4} = \frac{6}{5} \times \frac{4}{3} = \frac{24}{15} \text{ Ans.}$$

(69.)

| £. | s. | d. | gr. |
|----|----|-----------------|----------------|
| 1 | 19 | 11 | 3 |
| 1 | 19 | 11 | 3 |
| 1 | 19 | 11 | 3 |
| 1 | 17 | 11 | $\frac{3}{20}$ |
| | 1 | 9 | $\frac{3}{40}$ |
| | 1 | $1\frac{8}{10}$ | $\frac{7}{20}$ |

Ans. 3 19 11 0 $\frac{7}{20}$

NOTE. The first product is obtained by multiplying the multiplicand by 1, the second product by multiplying it by $\frac{1}{10}$, the third product by multiplying by $\frac{1}{20}$, and the fourth product by multiplying by $\frac{1}{40}$.

71. $\$100 - \$40 = \$60$; $\$60 : \$100 :: \$68.75 : \114.58 ; Ans.
72. $\$134.40 - \$120 = \$14.40$; $\$120 : \$14.40 :: \$100 : \12 per cent., Ans.
73. $\$3600 + \$4200 + \$2200 = \10000 ; $\$15000 \times .15 = \2250 ; $\$15000 - \$2250 = \$12750$; $\$12750 - \$10000 = \$2750$; $\$10000 : \$2750 :: \$36000 : \990 , Emerson's gain; $\$10000 : \$2750 :: \$4200 : \1155 , Bailey's gain; $\$10000 : \$2750 :: \$2200 : \605 , Curtis's gain.
74. $3\frac{1}{2}$ in. $\times 2 = 7$ in.; 4 ft. 9 in. = 57 in.; 3 ft. 7 in. = 43 in.; 2 ft. 11 in. = 35 in.; $43 \times 2 = 86$; $43 - 7 = 36$; $35 - 7 = 28$; $86 \times 57 = 4902$; $28 \times 2 = 56$; $56 \times 57 = 3192$; $36 \times 28 \times 2 = 2016$; $4902 + 3192 + 2016 = 10110$; $10110 \div 144 = 70\frac{1}{4}$ square feet; $57 - 7 = 50$; $43 - 7 = 36$; $35 - 7 = 28$; $50 \times 36 \times 28 = 50400$; $50400 \div 1728 = 29\frac{1}{4}$ cubic feet, Ans.
75. $64 \times 2 = 128$ ft.; $32 \times 2 = 64$ ft. From 64 ft. we subtract four times the thickness of the wall; 1 ft. 4 in. $\times 4 = 5$ ft. 4 in.; $64 - 5$ ft. 4 in. = 58 ft. 8 in.; $128 + 58$ ft. 8 in. = 186 ft. 8 in. = length of the wall of the house.

| ft. | in. | ft. | in. | ft. | in. | ft. | in. |
|--------|-----|-----|-----|-------|-----|-----|--------------------------------|
| 186 | 8 | 7 | 4 | 2 | 8 | 3 | 8 |
| 4 | | 3 | | 5 | 8 | 6 | 4 |
| 746 | 8 | 22 | 0 | 13 | 4 | 18 | 32 |
| 7 | | 3 | 8 | 1 | 9 | 14 | 2 |
| 3)5226 | 8 | 66 | 0 | 15 | 1 | 72 | 64 |
| 1742 | 2 | 14 | 8 | 4 | | 18 | cubic inches in a brick. |
| 6968 | 10 | 80 | 8 | 60 | 5 | 252 | |
| 765 | 11 | 1 | 4 | | 4 | | |
| 6202 | 11 | 6 | 8 | 241 | 9 | | |
| 12 | | | | 80 | 8 | | |
| 74435 | | | | 252 | | | |
| 12 | | | | 3)574 | 5 | | |
| 893226 | | | | 191 | 5 | | |
| 12 | | | | 765 | 11 | | |
| | | | | 1 | 4 | | |

64)10718720(167,480 bricks, Ans.

76. $\frac{1}{2}$ and $\frac{1}{2} = \frac{1}{2}$ and $\frac{1}{2} : \frac{1}{2} + \frac{1}{2} = \frac{1}{2} : \frac{1}{2} : \frac{1}{2} :: \$1000 : \$571.42\frac{1}{2}$, Benjamin's share; $\frac{1}{2} : \frac{1}{2} :: \$1000 : \$428.57\frac{1}{2}$, Samuel's share.
77. As Bailey occupied the whole house the first three months, he must pay $\frac{1}{3}$ of \$100 = \$33 $\frac{1}{3}$. As he occupied half of the next 3 months he must pay half of \$33 $\frac{1}{3}$ = \$16 $\frac{2}{3}$, and Bricket must pay the same sum, \$16 $\frac{2}{3}$. For the last 3 months, each must pay $\frac{1}{3}$ of \$33 $\frac{1}{3}$ = \$11 $\frac{1}{3}$. \$33 $\frac{1}{3}$ + \$16 $\frac{2}{3}$ + \$11 $\frac{1}{3}$ = \$61 $\frac{1}{3}$, Bailey's share of rent; \$16 $\frac{2}{3}$ + \$11 $\frac{1}{3}$ = \$27 $\frac{1}{3}$, Bricket's share; \$11 $\frac{1}{3}$ = \$11 $\frac{1}{3}$, Dana's share.
78. $42\frac{1}{4} \times 12 \times 24 \times 3 = 36504$ cubic inches, it being the solid contents of the plank. $3 \times 2 = 6$ inches, twice the thickness of the plank. We now subtract the cube of 6 from the contents of the plank; $6 \times 6 \times 6 = 216$; $36504 - 216 = 36288$; we next divide this remainder by 6, because there are 6 sides to a cube; $36288 \div 6 = 6048$. We now divide by 3, because the plank is 3 inches thick; $6048 \div 3 = 2016$. To this number we add $\frac{1}{3}$ of the square of 6 = 9 to compensate for certain deficiencies occasioned by deducting 216 from the corners of the box; $2016 + 9 = 2025$. By extracting the square root of this number, we obtain the distance from the outside of the box to the opposite inside of it; $\sqrt{2025} = 35$ inches. If to this number we add 3 inches, the thickness of the plank, we obtain the side of the cubical box; $45 + 3 = 48$ inches, Ans.

NOTE. In the first edition of the Arithmetic, the width of the plank is 12 inches; but it should be 24 inches.

OPERATION BY ALGEBRA.

Let x represent the length of the outside of the box, and y the inside of it. Then

$$x - y = 6$$

$$\text{And } x^3 - y^3 = 36504.$$

$$x = y + 6.$$

By cubing both sides of this equation,

$$x^3 = y^3 + 18y^2 + 108y + 216.$$

Let this be substituted for x^3 in the second equation. Then

$$y^3 + 18y^2 + 108y + 216 - y^3 = 36504.$$

And by reduction,

$$18y^2 + 108y = 36504 - 216 = 36288.$$

$$y^2 + 6y = 2016.$$

$$y^2 + 6y + 9 = 2016 + 9 = 2025.$$

$$y + 3 = 45.$$

$$y = 45 - 3 = 42 \text{ inches, inside of the box.}$$

And $45 + 3 = 48$ inches, outside of the box, Ans.

79. $\$100 - \$10 = \$90$; $\$100 + \$16 = \$116$; $\$116 - \$90 = \$26$; $\$26 : \$100 :: \$21.84 : \84.00 , real value of the horse; $\$100 : \$90 :: \$84.00 : \75.60 , price paid, Ans.

80. $\$100 - \$12 = \$88$; $\$88 : \$100 :: \$4.40 : \5.00 ; $\$100 : \$110 :: \$5.00 : \5.50 , Ans.

(81.)

| | | |
|--------------------------------|-----------------|------------|
| Emily, Jane, | Abigail, Nancy, | $\$19,000$ |
| Emily, Jane, Betsey, Abigail, | | $19,200$ |
| Jane, Betsey, Abigail, Nancy, | | $20,000$ |
| Emily, Betsey, Abigail, Nancy, | | $20,500$ |
| Emily, Jane, Betsey, Nancy, | | $21,300$ |

$$4) \underline{\underline{\$100,000}}$$

Sum of the fortunes, $\$25,000$

$\$25,000 - \$19,000 = \$6,000$, Betsey's fortune.

$\$25,000 - \$19,200 = \$5,800$, Nancy's fortune.

$\$25,000 - \$20,000 = \$5,000$, Emily's fortune.

$\$25,000 - \$20,500 = \$4,500$, Jane's fortune.

$\$25,000 - \$21,300 = \$3,700$, Abigail's fortune.

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